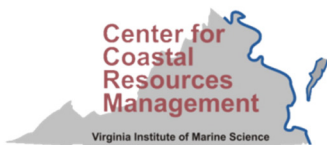


Tidal Wetlands Management Technical Support

Center for Coastal Resources Management
Virginia Institute of Marine Science
Grant #NA13NOS4190135, Task #7

11/7/2014



Virginia Coastal Zone
MANAGEMENT PROGRAM

This project was funded, in part, by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA13NOS4190135 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended. The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce, NOAA, or any of its subagencies

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Product 1: General Technical Guidance

The Wetlands Program continues to provide technical advice to both the general public, and regulatory and non-regulatory authorities with regard to tidal shorelines. This advice is provided via phone, email, and/or when feasible on-site. In order to maximize the efficacy of site visit efforts, we focused on requests that involved proposed living shoreline projects and those from more rural localities. Advice is derived from routinely used data and tools including on-line resources at CCRM/VIMS, from other coastal partners and agencies, aerial imagery, decision tools and decision models. In an effort to more closely identify the type of advice requested from the Wetlands Program, CCRM implemented a new database to track our advisory work.

Total Number of Requests/Responses:

Oct 1, 2013 – Sept 30, 2014 172 Technical Advisory and General Information

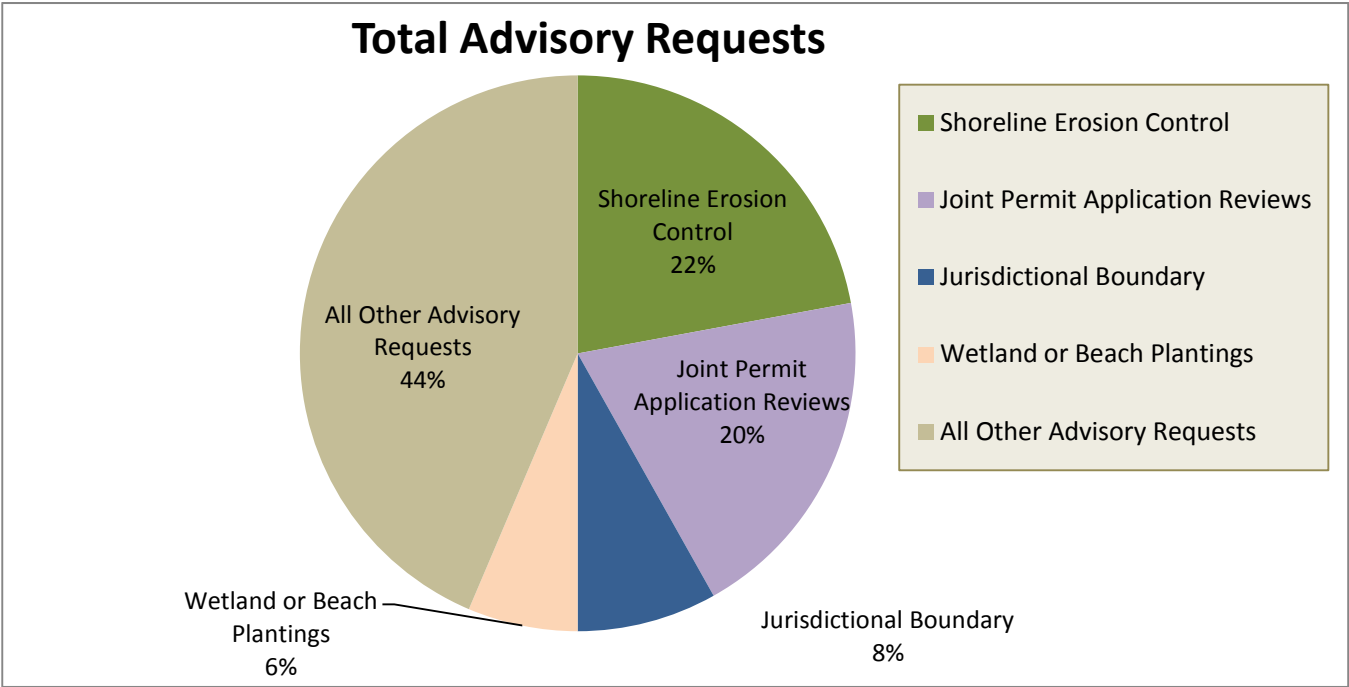
Type of Advice Requested:

• Shoreline Erosion Control (28 of these specific to living shorelines)	38
• Joint Permit Application Reviews	34
• Jurisdictional Boundary Determination/Delineation	14
• Wetland or Beach Plantings	11
• GIS Data	8
• Procedural Guidance	4
• Shallow Water Dredging	4
• Impact Data/Assessment	3
• Phragmites/Invasive Species Control	3
• Submerged Aquatic Vegetation (SAV)	3
• Contact Information	3
• Floating Wetlands	3
• Pending Legislative Review	2
• Wetlands Compensation/Mitigation	2
• Pesticides Application Near Wetlands	2
• VIMS Permit Record Website	2
• MHW & MLW Datums	2
• CCRMPs	2
• Violations	1
• Miscellaneous (grants, artificial reefs, training, regulations, stormwater management, climate change, etc.)	31

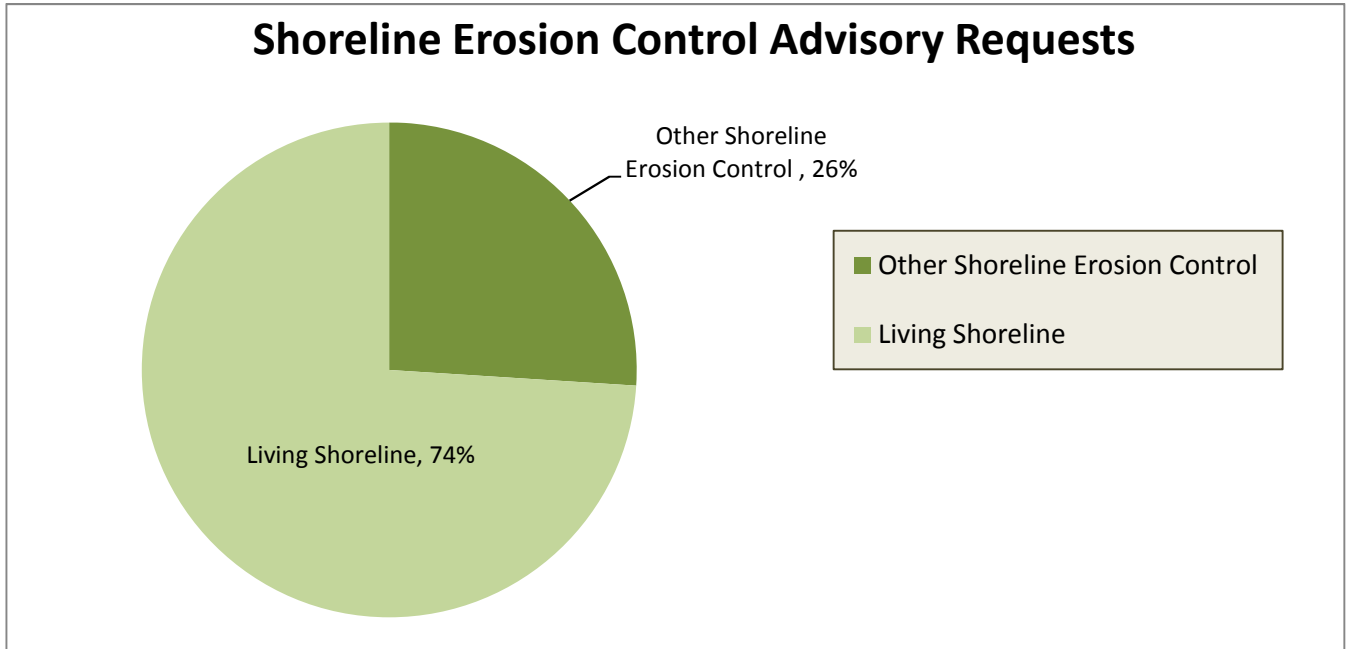
Advice Requested From:

• VMRC Staff	50
• Citizen/Property Owner	49
• Local Government Staff or Wetlands Board Member	33
• State Agency	10
• Community/Non-profit/NGO	8
• Marine Contractor	7
• Consultant	7
• Other (PDC, out of state, academia, attorney, corps, etc.)	14

Details of Living Shoreline Requests

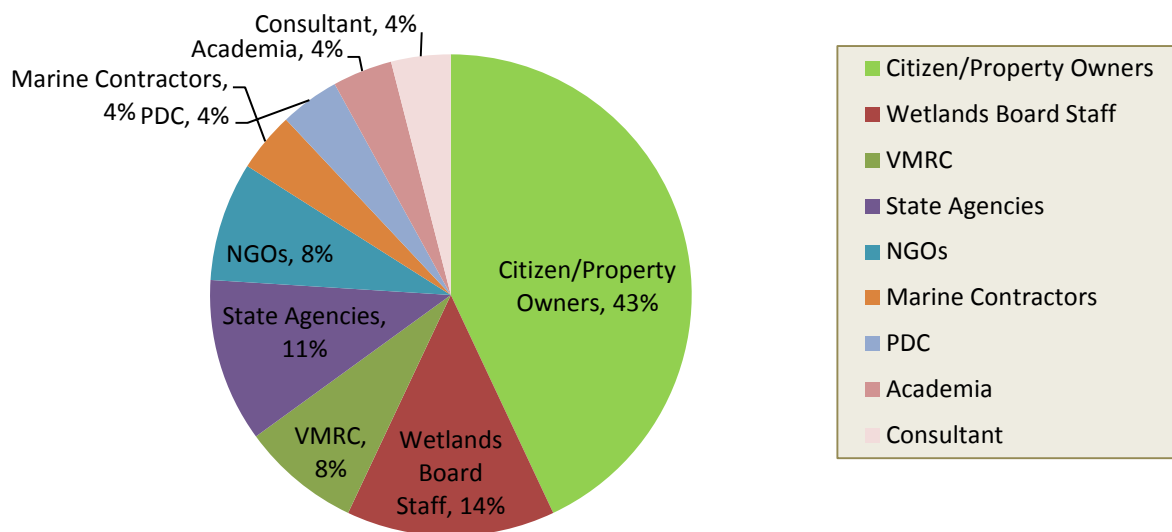


Of the advisory requests associated with shoreline erosion control (above), 74% were related to the living shoreline management approach:



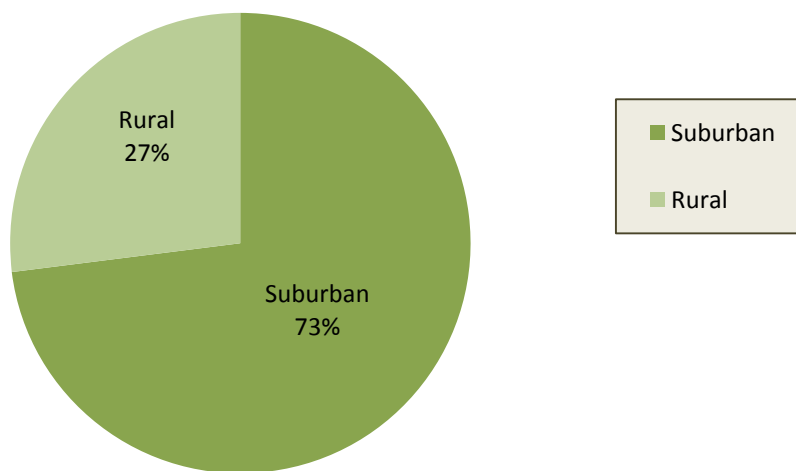
Citizen and property owners are the largest group requesting information on living shorelines:

Who is Requesting Living Shoreline Advice?



Where do these citizen/property owners live?

Locality Type



* Locality designation was defined by housing unit density; Rural tracts = less than 64 housing units per square mile, Suburban tracts = 64 to 1,600 housing units per square mile, and urban tracts = greater than 1,600 housing units per square mile. Housing density information obtained from the U.S. Census.

Impact Assessment Statement:

This year we have no numbers to report that would comprehensively reflect tidal wetland permitted losses. VIMS has recently experienced significant losses in funding which have resulted in changes to our operations. We no longer conduct routine site visits and produce impact and alternatives assessments for every permit application. We do still maintain and serve digital records of permit applications and associated documentation. We do supply permit assessments for complex and controversial projects when requested. We are also committed to giving advice on all living shoreline projects.

CCRM/VIMS had twice, with Virginia Coastal Zone Management partnership, sought funding to resolve the issue of tracking tidal shoreline resources in Virginia without success. It is unfortunate that the NOAA review team did not understand the complexity of tracking tidal wetlands actions in Virginia and opted not to fund the project on the first round and that the funding was pulled on the second round.

Perhaps VMRC has some numbers to report.

VIMS Shoreline Permit Application Report

VMRC # 14-0591

Applicant: Richard Cromwell



Locality: City of Portsmouth

Immediate Waterway: Western Branch Elizabeth River

Requested by:
Justine Woodward, VMRC

Report Date: 5/15/2014

Proposed Project:

The applicant proposes to install 15 LF of new riprap revetment and 284 LF of riprap overlay overtop existing concrete/brick rubble riprap located along his shoreline adjacent to a pocket marsh feature situated on the Western Branch of the Elizabeth River.

Existing Conditions:

The project site is a low-energy shoreline that appears stable. The bank is low with a wide pocket marsh present channelward of the bank. There is an existing concrete/brick riprap rubble structure located on the bank. An existing residential structure is located within approximately 40 feet from the shoreline. A strip of riparian area adjacent to the shoreline has been landscaped in shrubs and mulch with the remainder of the riparian area and yard in mowed lawn.

Comments & Recommendations:

We question the need for a structure along this shoreline. This is a very low energy, protected shoreline. The bank appears to be stable. There is no evidence of erosion from the pictures provided. In addition, the existing structure is not a properly designed functioning revetment and does not appear to be necessary. From an integrated resources management perspective, we recommend that the existing rock rubble structure be removed to reestablish the connection between the intertidal and riparian areas. The bank should only be minimally graded where absolutely necessary to maintain a stable slope and support the establishment of vegetation. We recommend a mixture of native wetland plants and riparian vegetation such as woody shrubs and groundcover be planted along the shoreline and upland bank, at the appropriate elevation to support these plants. Shoreline vegetation provides habitat and water quality benefits in addition to stabilization.

Coastal systems (subaqueous, intertidal and riparian areas) provide valuable ecosystem services such as water quality maintenance and improvement and terrestrial and aquatic habitat. Activities along the shoreline should avoid adverse impacts to these shoreline resources. Preserving and enhancing natural systems such as marshes and riparian areas is always the preferred approach to erosion protection.

Product 2: Education / Outreach

Tidal Wetlands Workshop – Living Shorelines in Virginia: Current Practices, Research, & Policy

The Center for Coastal Resources Management hosted our annual Tidal Wetlands Workshop on May 22, 2014 at VIMS. This workshop was attended by 149 people made up of local government staff, advisory board members, marine contractors, permitting agents, environmental consultants, and others interested in the current status and future direction of living shorelines. The program included presentations, panel discussions, and a small breakout group discussion. Speakers and panelists included VIMS CCRM scientists, private marine contractors, a wetlands board member, and representatives from the City of Norfolk, the US Army Corps of Engineers, and VMRC.

Listed below, all presentations and other workshop materials are available online:

<http://ccrm.vims.edu/Spring2014.html>

Presentations

- Living Shorelines in Virginia: What's happened since the 2006 Living Shorelines Summit?
- The Ecology of Living Shorelines research update
- Promoting Living Shorelines: Recognizing Barriers & Implementing Solutions
- 2014 General Assembly Update

Panels

- The Business of Living Shorelines: Perspectives from marine contractors & consultants
- The Regulation of Living Shorelines: Perspectives from Local-State-Federal Regulatory Agencies

Facilitated Breakout Groups & Report Out

- Summary of Breakout Group Discussions & Reports

Other Workshop Information

- Workshop Participants
- Workshop Evaluations (actual submitted forms are available online)

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- Summary of Breakout Group Discussions & Reports

Other Workshop Information

- Workshop Participants
- Workshop Evaluations

Living Shorelines in Virginia: Current Practices, Research & Policy

Thursday, May 22, 2014

Virginia Institute of Marine Science

Gloucester Point, VA

PLANNED AGENDA

8:00 – 9:00	Check-in & Coffee - Watermen's Hall Lobby
9:00 – 10:00	Living Shorelines in Virginia: What's happened since the 2006 Living Shorelines Summit? <i>Karen Duhring, VIMS-CCRM</i>
	The Ecology of Living Shorelines <i>Dr. Donna Bilkovic, VIMS-CCRM</i>
10:00 – 10:15	Break
10:15 – Noon	The Business of Living Shorelines: Perspectives from marine contractors & consultants <i>Jim Cahoon, Bay Environmental, Inc.</i> <i>Craig Palubinski, Bayshore Design</i> <i>Jeff Watkins, Riverworks</i>
	The Regulation of Living Shorelines: Perspectives from Local-State-Federal Regulatory Agencies <i>Brad O'Berry, City of Suffolk Wetlands Board</i> <i>Chip Neikirk, Virginia Marine Resources Commission</i> <i>Nancy Hankins, U.S. Army Corps of Engineers Norfolk District</i>
12:00 – 12:45	LUNCH - Box lunch served in lobby, seats available in classrooms A, B, & C and outside (weather permitting) Go to assigned breakout rooms after lunch
12:45 – 1:45	Facilitated Breakout Groups to answer 2 questions: Why is the practice of living shorelines still challenging, what keeps more people from choosing Living Shoreline alternatives? (report out top 3) What are possible solutions to these challenges? (report out top 3)

1:45 – 2:00	<i>Break & return to auditorium</i>
2:00 – 2:45	Sector Group report outs & facilitated discussion across sectors
2:45 – 3:15	Promoting Living Shorelines: Recognizing Barriers & Implementing Solutions <i>Kevin Du Bois, City of Norfolk</i>
3:15 – 3:30	2014 General Assembly Update <i>Chip Neikirk or Tony Watkinson, Habitat Management Division, VMRC</i>

Living Shorelines Web Site Links

VIMS Living Shorelines

<http://ccrm.vims.edu/livingshorelines/index.html>

U.S. Army Corps of Engineers 13-RP-19 Regional Permit 19

<http://www.nao.usace.army.mil/Portals/31/docs/regulatory/RPSPdocs/13-RP-19.pdf>

2013 Mid-Atlantic Living Shorelines Summit

<http://www.estuaries.org/2013-mid-atlantic-living-shorelines-summit.html>

2006 Living Shorelines Summit Proceedings

http://www.vims.edu/cbnerr/coastal_training/recent_workshops/ls_summit.php

Living Shorelines in Virginia: What's Happened Since the 2006 Living Shorelines Summit?

Karen Duhring

Center for Coastal Resources Management
Virginia Institute of Marine Science
College of William & Mary

May 22, 2014



Coastal development continues to drive demand for shoreline protection



Shoreline Hardening Trend

The placement of bulkheads and revetments along the shoreline “hardens” previously natural shoreline conditions.



Many small shoreline projects over time & space have altered large geographic areas, even where these shoreline structures are absent.

US States with Living Shoreline Programs

due to concerns for shoreline hardening trend

- Northeast
 - Connecticut
 - Rhode Island
 - New York
 - New Jersey
 - Delaware
- Mid-Atlantic & Southeast
 - Maryland
 - Virginia
 - North Carolina
 - Florida
- Gulf Coast
 - Alabama
 - Mississippi
 - Texas
- West & Northwest
 - California
 - Oregon
 - Washington

National Living Shoreline Partnership Initiatives

SAGE - Systems Approach to Geomorphic Engineering

NFWF - National Fish & Wildlife Foundation

RAE - Restore America's Estuaries

Gulf of Mexico Alliance

Hudson River Sustainable Shorelines

Partnership for the Delaware Estuary

North Carolina Coastal Federation

The Watershed Project, San Francisco Bay

Chesapeake Bay Trust

Inspiration for Today's Program

[Mid-Atlantic Living Shorelines Summit](#) December 10 & 11, 2013



Variety of living shoreline stakeholders & practitioners

Increased awareness & appreciation for different perspectives

How can we better communicate across sectors?

What exactly are Living Shorelines for Erosion Protection?

a **shoreline management practice** that:

- provides erosion control and water quality benefits;
- protects, restores or enhances natural shoreline habitat;
and
- maintains coastal processes

through the strategic placement of plants, stone, sand fill, and other structural and organic materials.

Non-Structural Approaches

Forest Stewardship



Enhance Existing Marsh &/or Riparian Buffer



Grade Bank & Restore Riparian Buffer



J. Scalf

Planted Marsh & Fiber Logs



Beach Nourishment & Dune Creation

Hybrid Approaches

Vegetated & Sand Beach Habitats with supporting structures



Planted Marsh with Sill

Tidal Marsh
Dominated Shorelines



Offshore Breakwaters
with Beach Nourishment

Sand Beach
Dominated Shorelines

Also Known as Vegetative Stabilization

Low impact stabilization alternative since 1970's

Addition of offshore structures started in 1980's

- to support vegetation & beach habitats in moderate energy settings



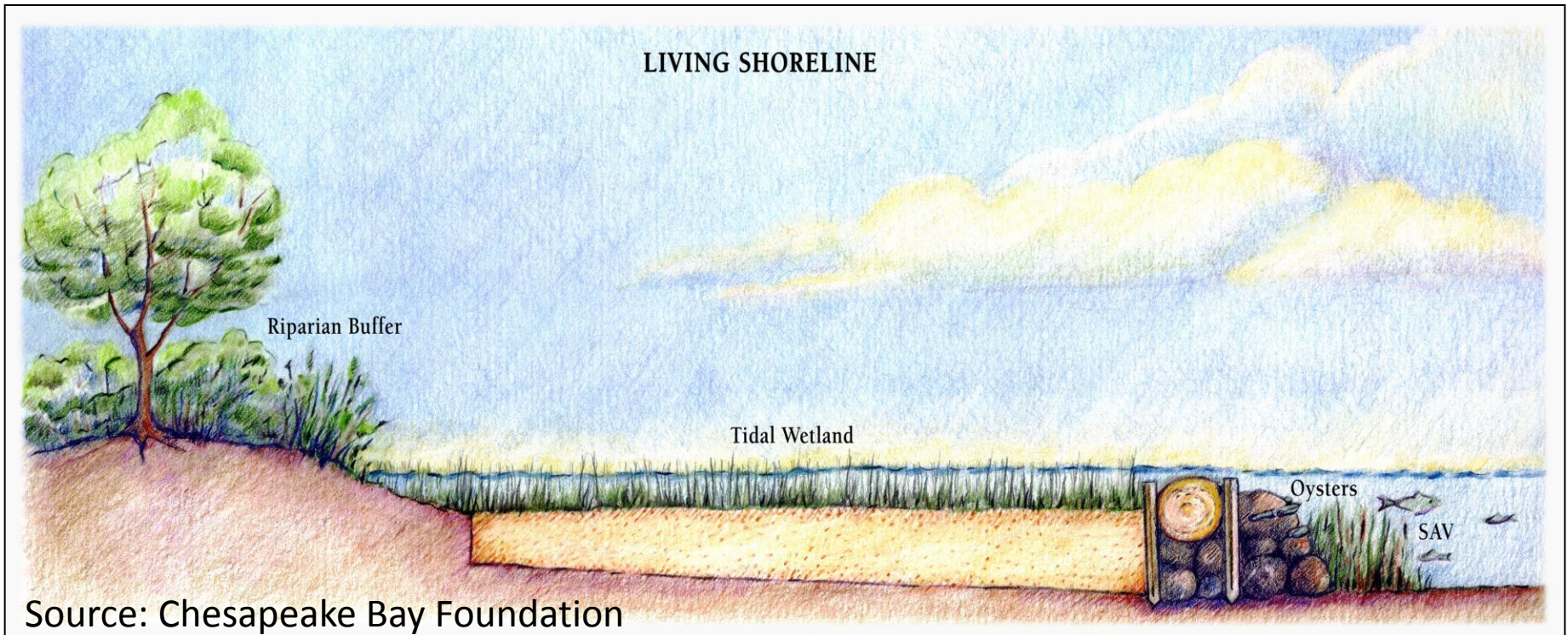
VIMS planted marsh & sill effective since 1983

Living Shoreline Treatments

Vegetation is dominant – Riparian Buffer + Wetland

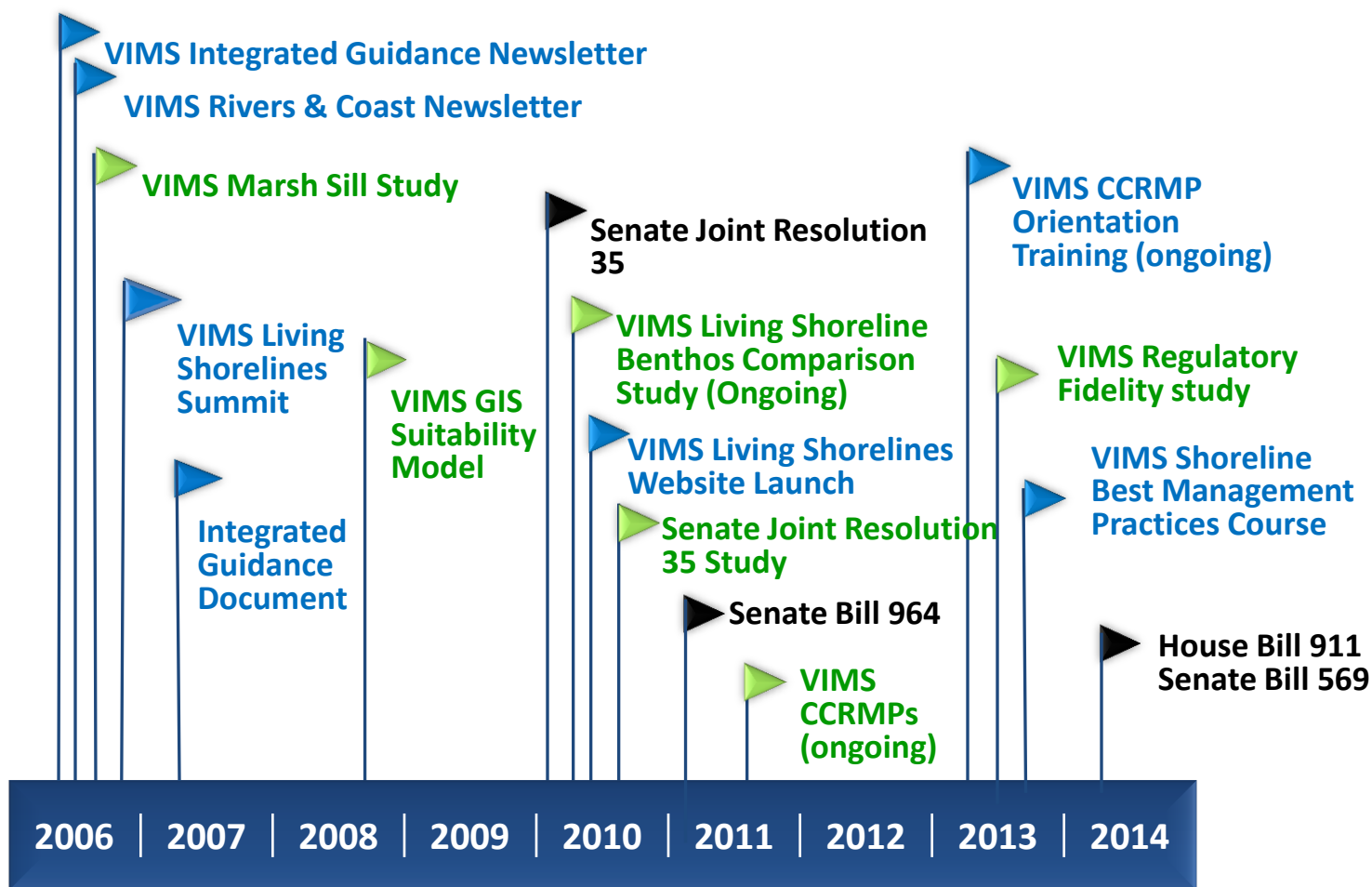
Bank Grading & Sand create suitable slopes & elevations

Stone is minor element to support vegetation & sand



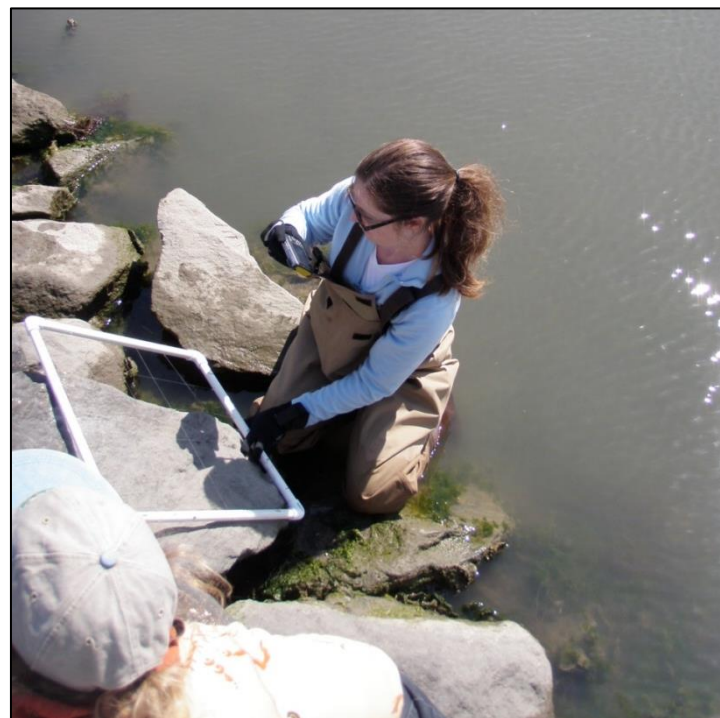
Recent Living Shoreline Activities in Virginia

- ▶ Outreach
- ▶ Research
- ▶ Policy



Ecology Research

Comparisons with bulkheads & revetments
Investigating the physical & biological processes
& habitat tradeoffs



Social Science & Regulatory Research

Investigating the human element
& reasons for shoreline choices

- Marine Contractor Needs Assessments
- Marine Contractor & Property Owner opinion surveys
- Collective analysis of permit records & permit decisions

**Bulkheads & revetments still more popular than
non-structural and hybrid living shoreline alternatives
for a variety of reasons**

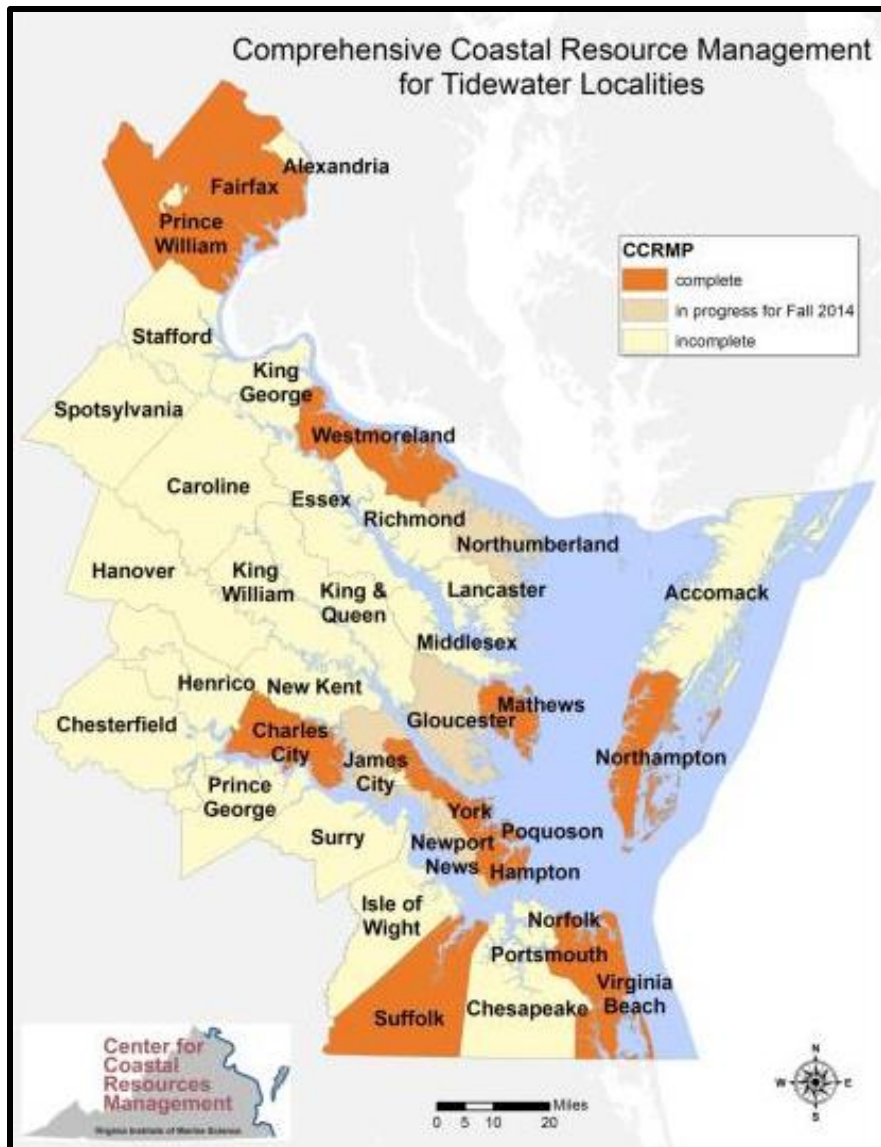
New Virginia Living Shoreline Policy

Senate Bill 964 (July 1, 2011)

- “Living shoreline” methods for erosion protection are the preferred alternatives for tidal shoreline stabilization
- New **supporting guidance** must be developed
 - Explain alternatives & site suitability
 - Administrative process improvements among jurisdictions
- **General Permit** for living shorelines authorized
 - Expedited permit issuance for projects meeting specific qualifying criteria

New Guidance & Tools

Comprehensive Coastal Resource Management Portal



Locality-Specific CCRMPs

- Updated shoreline & tidal marsh inventories
- Shoreline management model
- Comprehensive coastal resource management web portal & map viewers
- Sea-level rise risk & vulnerability tool

ccrm.vims.edu/ccrmp

CCRMP Shoreline & Tidal Marsh Inventory

2014 Updates

	2014
James City County	X
Northumberland County	X
Gloucester County	X
Newport News	X
Norfolk	X

Total 17 Localities by December 2014

New Guidance & Tools

VIMS Shoreline Studies Program

- [2010 Living Shoreline Design Guidelines & Class](#)
available on-line
 - Textbook, class presentations, Google map tools

Locality-Specific

- Shoreline Evolution Reports & [GIS Map Viewer](#)
- Shoreline Protection & Management Plans

Grant-Funded Demonstration Projects

- **Hermitage Museum**

- Virginia Zoo
- Coley Bay

- **Hull Springs**

- Jamestown 4H & Beach
- Johns Point Landing
- Oyster Village
- Camp Occohannock

Hopefully Coming Soon

- Sleepy Hole Park
- Mariners Museum
- Leesylvania State Park
- Friends of
Rappahannock projects

Hermitage Museum, Norfolk VA

2005



Hermitage Museum, Norfolk VA

2006



W. Priest

Hermitage Museum, Norfolk VA

2014



Hermitage Museum, Norfolk VA

2014



Native Oyster Restoration Reefs
in the lee of marsh sills

Recent Virginia Coastal Storms

Sept 2003	TS Isabel
Sept 2006	TS Ernesto
Oct 2006	moderate Nor'Easter <i>with slightly higher water than Ernesto</i>
Nov 2006	moderate Nor'Easter
Nov 2009	Norlida aka Veterans Day storm
Sept 2010	TS Nicole <i>remnants</i>
Aug 2011	Hurricane Irene <i>minor in estuary, major on ocean coast</i>
Sept 2011	TS Lee <i>major rain event along I-95 corridor</i>
Oct 2012	Hurricane Sandy <i>bayside Eastern Shore hit worst</i>
March 2013	winter storm Saturn <i>heavy NNW winds</i>
June 2013	TS Andrea <i>mostly rain</i>
Oct 2013	Nor'Easter winter storm Atlas <i>remnants</i>

Hull Springs, Westmoreland Co.

Case study for storm resilience

2007



Hull Springs

2008



Hull Springs

2010 Nor'easter



B. Burton

Hull Springs

2011 day after Hurricane Irene



Hull Springs

2012 during Hurricane Sandy



B. Burton

Former property director reported
no bank failure during any of these storms

Private Project Case Studies

Stephan Fiber Log Project

Construction access & habitat conversion approval challenges



Stephan Fiber Log Project



J. Scalf

Stephan Fiber Log Project



J. Scalf

Rust Marsh Sill Project

Photos courtesy Mary Rust, Stafford County Wetlands Board member

Construction access & Do-It-Yourself challenges



High eroding bluff, remote location

Rust Marsh Sill Project

Gabion breakwaters were installed, sand fill was placed & freshwater tidal marsh & riparian buffer vegetation was planted.



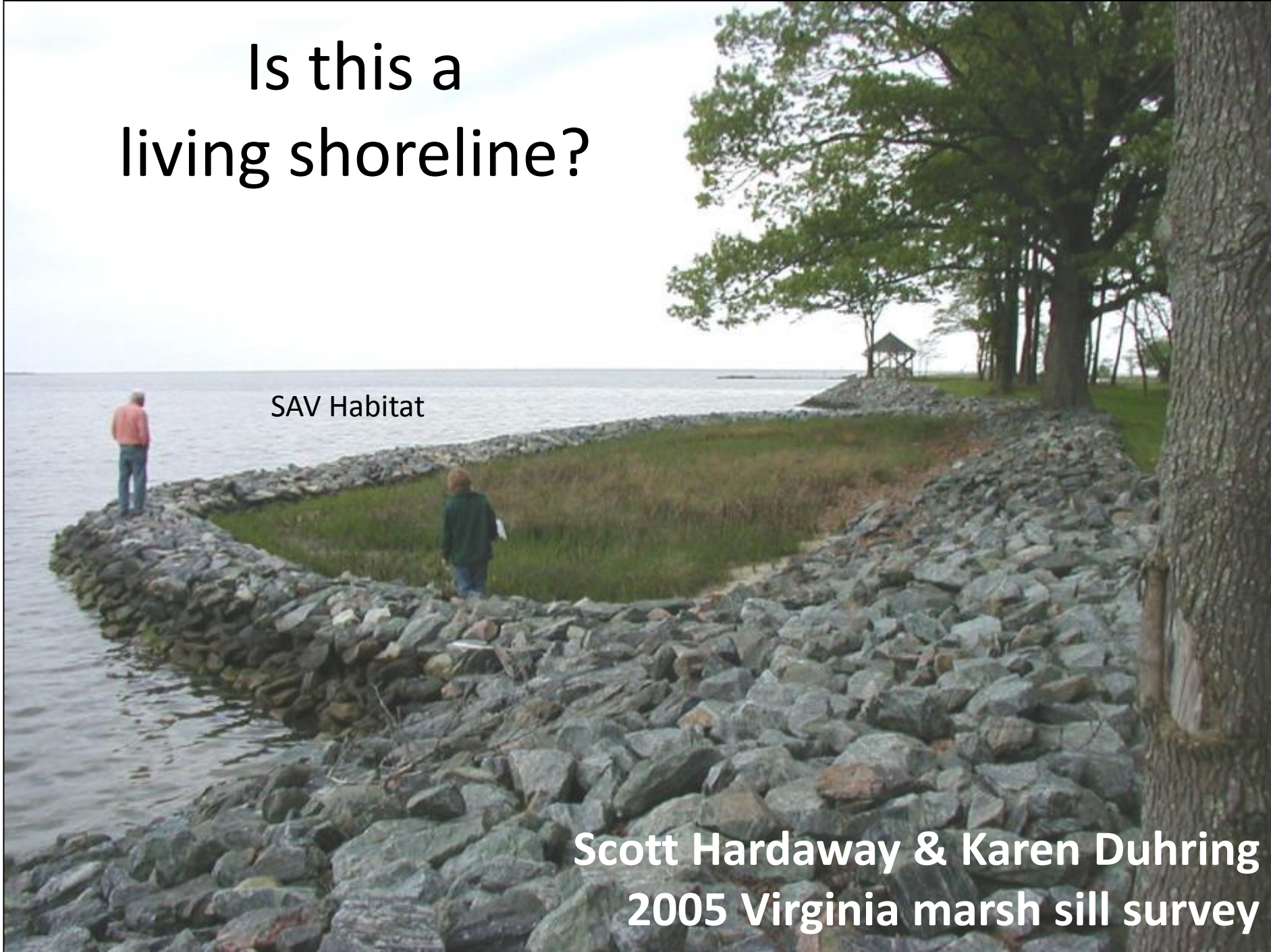
Rust Marsh Sill Project



Is this a living shoreline?

SAV Habitat

**Scott Hardaway & Karen Duhring
2005 Virginia marsh sill survey**



Design Challenges

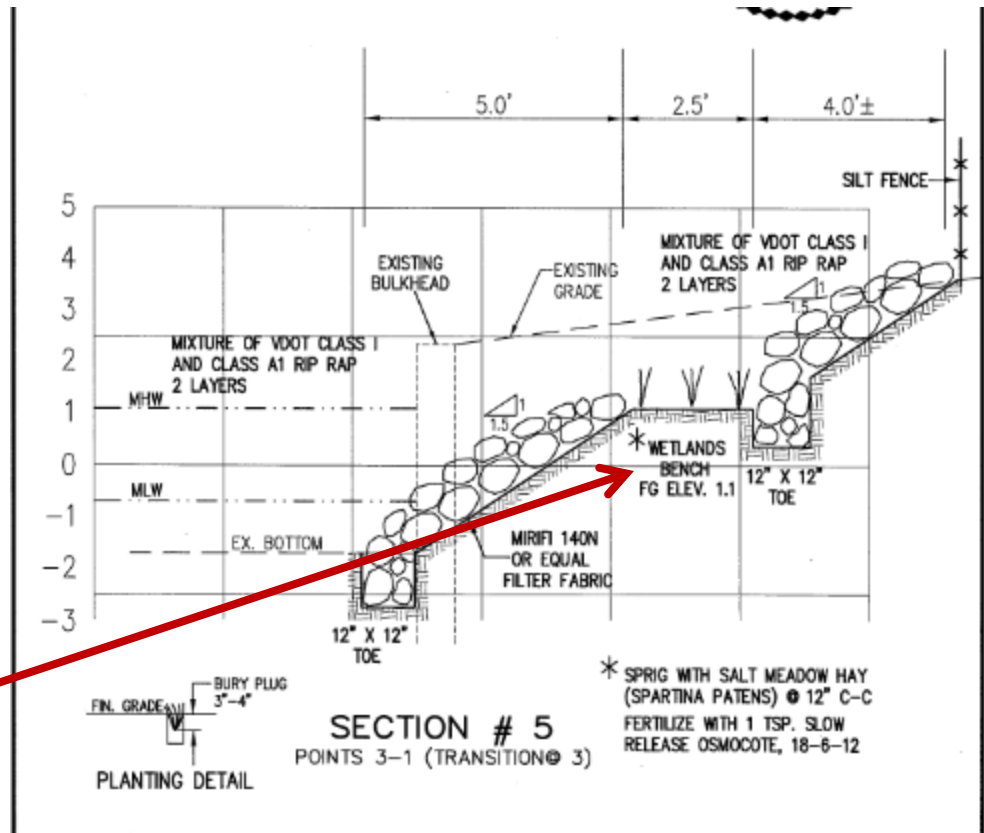
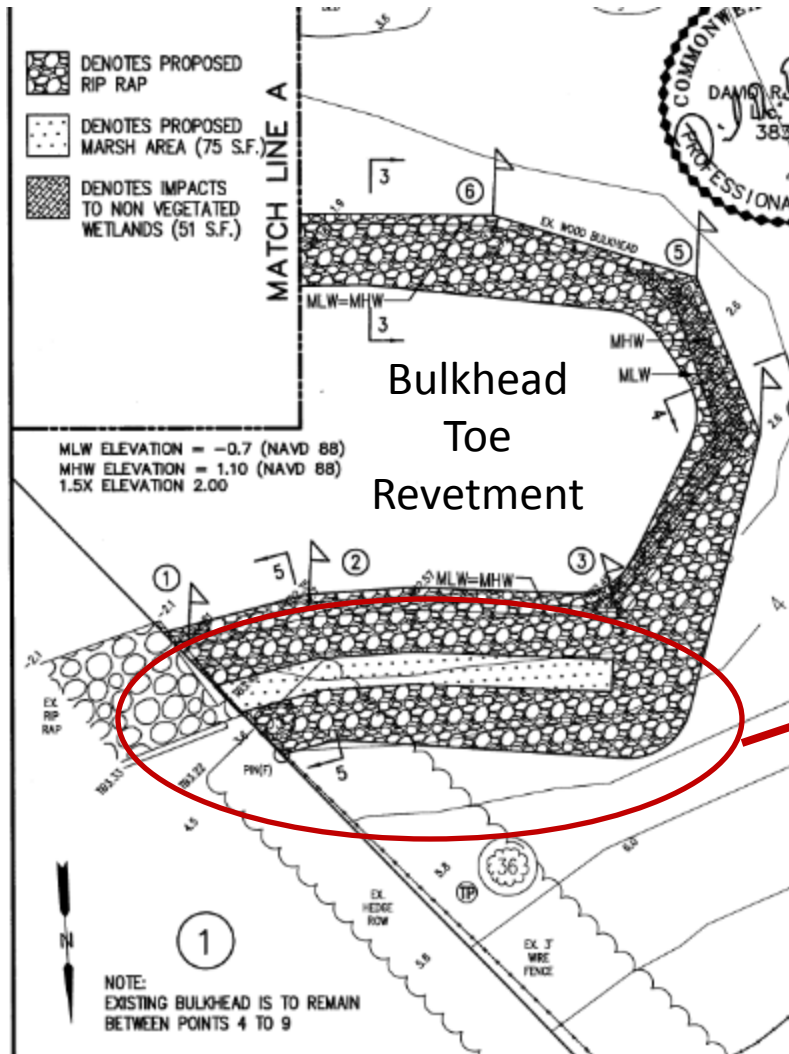
Why are some marsh sills very large?



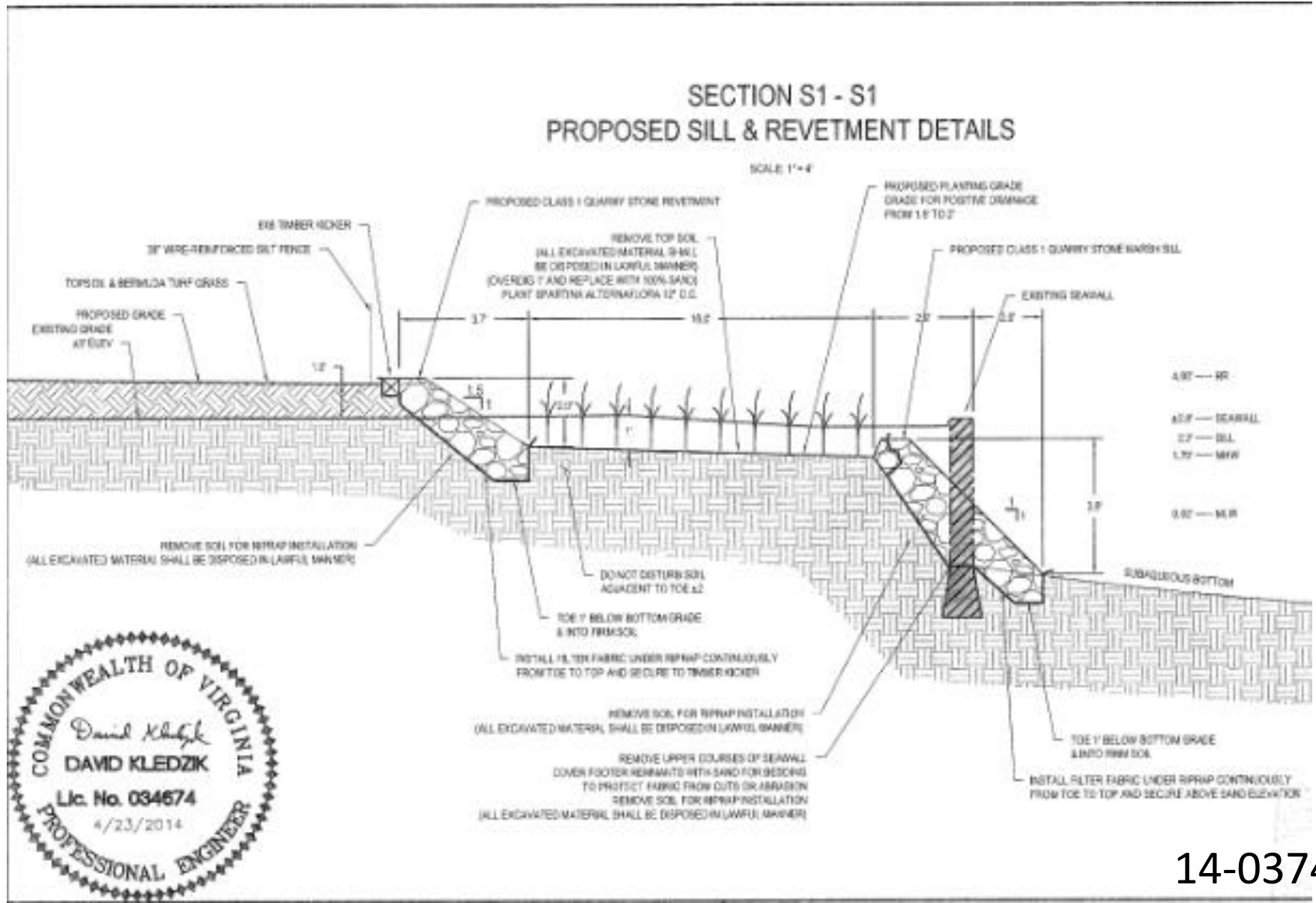
Why do many projects include both a marsh sill & revetment against the bank?



Recent “Living Shoreline” JPAs Planted Marshes Caught in the Middle



Recent “Living Shoreline” JPAs Planted Marshes Caught in the Middle

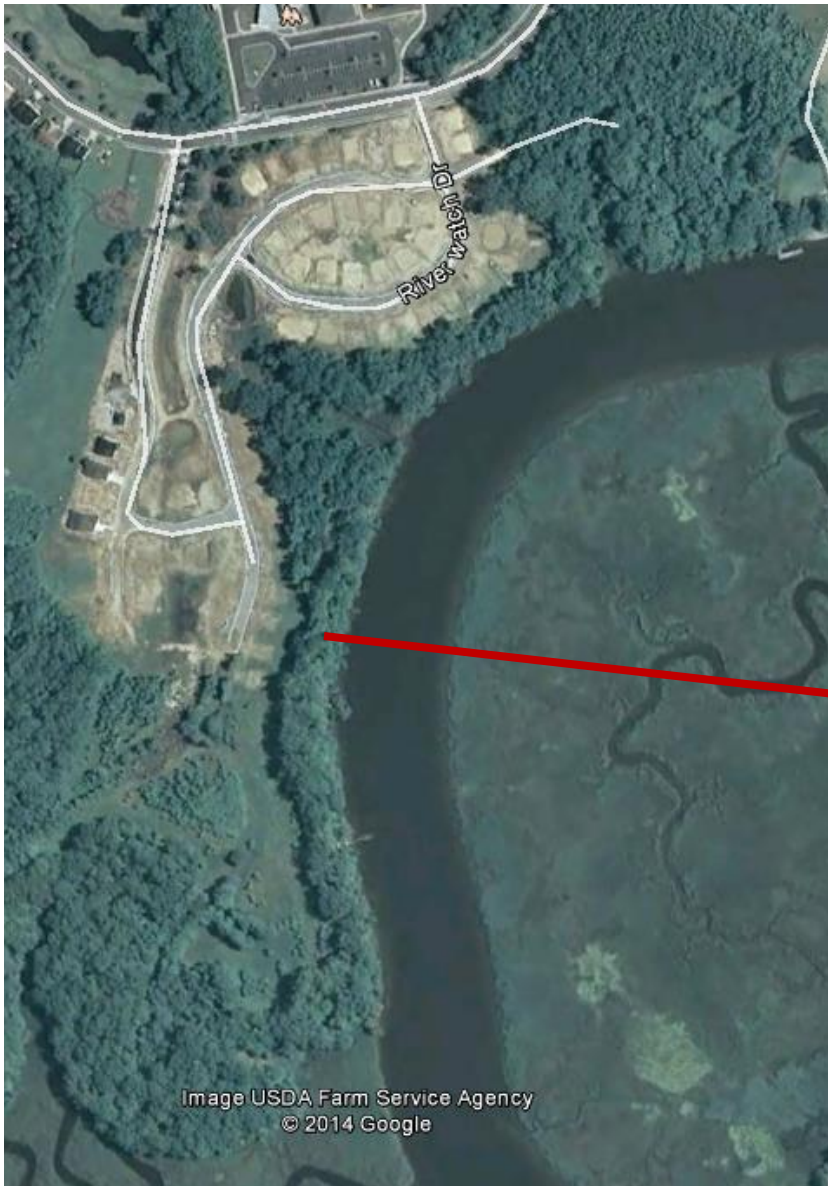


River Bluff Case Study, Suffolk

Planted marshes with fiber logs

When should bank grading be included?

Unauthorized bank clearing after the fact



River Bluff Case Study



Construction process challenges with bank stabilization



Riparian buffer restoration challenges

River Bluff Case Study

How should
geotextile
materials be
used?



Dead fiddler crabs trapped in
geotextile material



River Bluff Case Study

Lag time for marsh establishment, buildup of organic matter
When is project “complete” with different phases?



Second phase - 1st growing season



First phase - 2nd growing season

A Few Living Shoreline Challenges

illustrated by these case studies

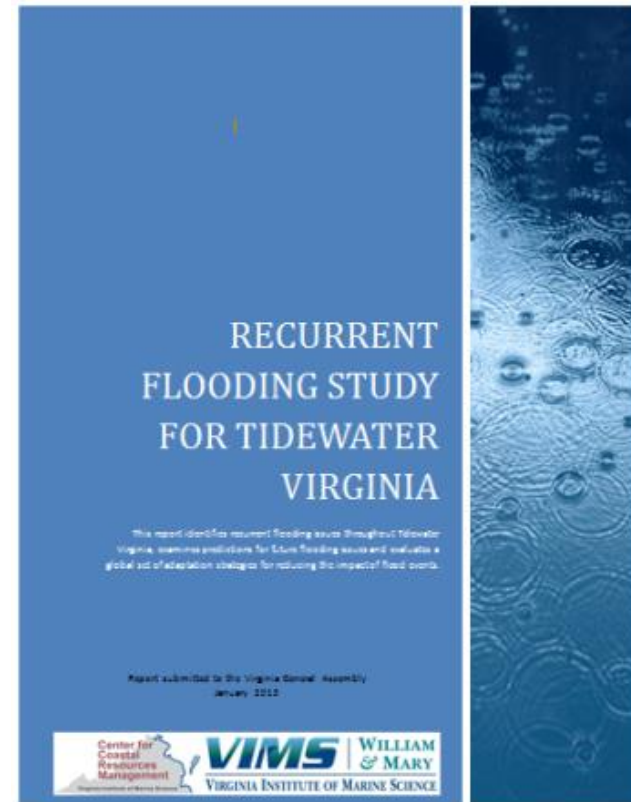
- Are shallow water habitat tradeoffs acceptable?
- How wide do tidal gaps need to be without losing protection?
- Why are bank toe revetments so common in addition to sills?
- What alternatives can be used where construction access is restricted?
- How can native oysters be included in project designs?
- When is tree clearing & bank grading appropriate?
- How can local permit processes for wetlands & CBPA be coordinated?
- How should geotextile materials be used?
- If a project is constructed in phases, when is it considered 'complete' ?

Larger Living Shorelines Context:

How can other programs help drive
implementation?

Climate Change & Sea Level Rise

- Now recognized as current events, not future problem
- Local adaptation strategies include shoreline management actions & programs
- Carbon sequestration potential of tidal wetlands under investigation



Chesapeake Bay TMDL Mandates

- Local governments must address & implement actions
- Tidal shorelines are last line of defense
 - Sediment load reduction
 - Denitrification
 - Sediment accumulation
- Chesapeake Bay Program BMP verification panel: shoreline erosion
 - Final report & credit allocations coming soon



Please Share Your Living Shorelines Observations & Experiences!

Contact Information:

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Gloucester Point, VA 23062

(804) 684-7159

karend@vims.edu

ccrm.vims.edu



The Ecology of Living Shorelines



Donna Marie Bilkovic and Molly Mitchell
Center for Coastal Resources Management
Virginia Institute of Marine Science

22 May 2014



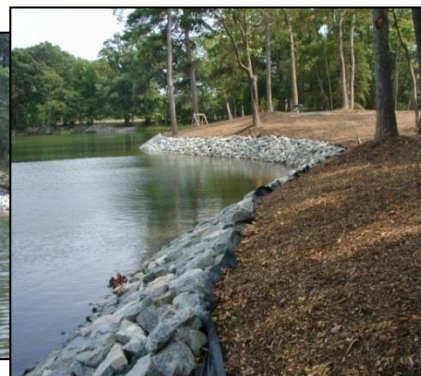
*donnab@vims.edu
<http://ccrm.vims.edu>

The Problem with Shoreline Hardening



- Habitat loss & fragmentation – forest, wetlands (Peterson and Lowe 2009; Dugan et al 2011)
- Connections btw upland & wetland severed
- Sediment supply & transport altered, increased scouring, turbidity (Bozek and Burdick 2005, NRC 2007)
- Static homogeneous shoreline, less biodiversity
- Increase in invasive spp (Chambers et al 1999)
- Decrease fish & benthos diversity (Peterson et al 2000, Chapman 2003, King et al 2005, Bilkovic et al 2006, Seitz et al 2006, Bilkovic & Roggero 2008, Morley et al 2012)
- Prevents natural migration of habitats with SLR

Chesapeake Bay
18% of tidal shoreline hardened
VA: 11% MD: 28%
32% riparian land developed
~5 km² of artificial substrate introduced (*intertidal impacted*)



Continuum of shoreline protection approaches

Estuarine & coastal shorelines



Eastern Shore: The Virginia Coast Reserve



Tabbs Creek, VA



Minimally-Moderately altered



Created marsh



Oyster-sill

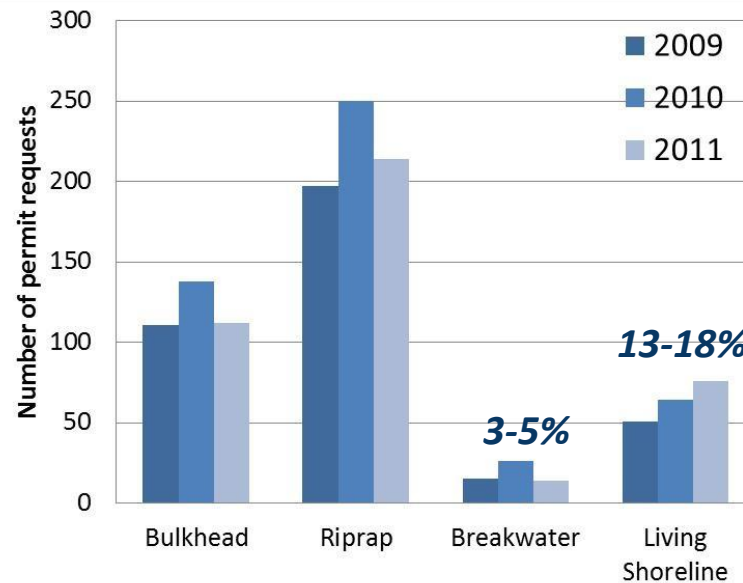
Highly altered



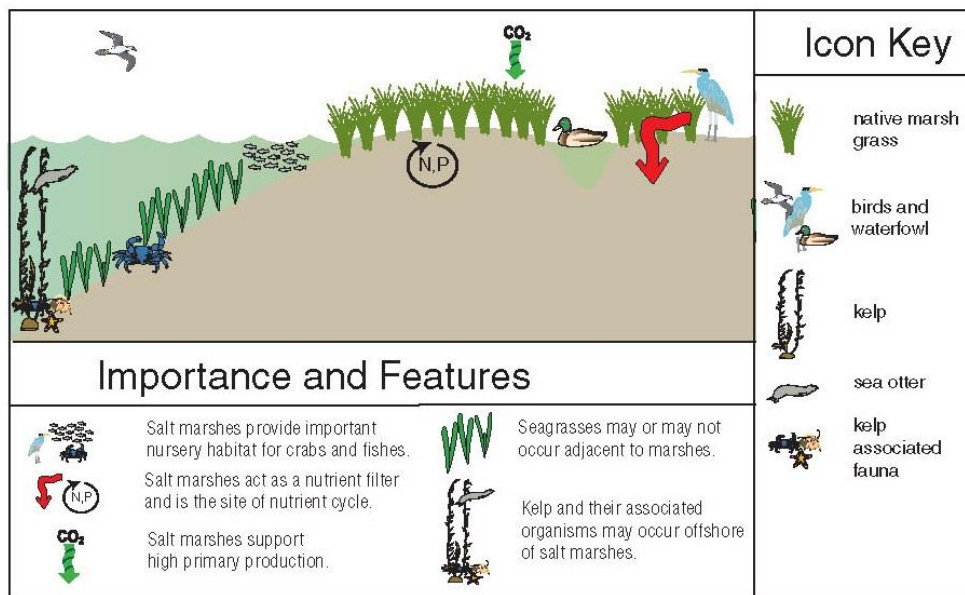
Bulkhead



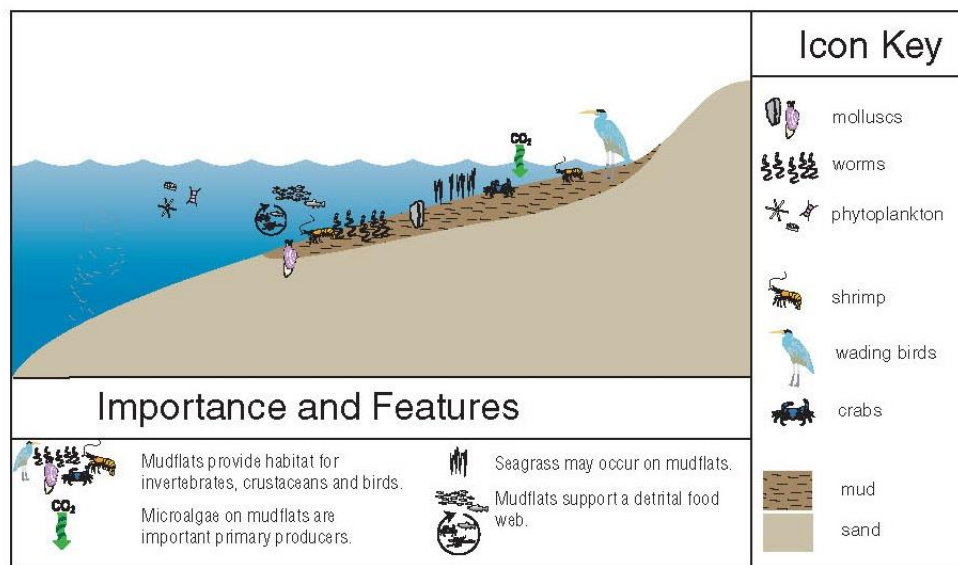
Riprap Revetment



Ecosystem services of tidal marsh, flats, beaches, and shallows



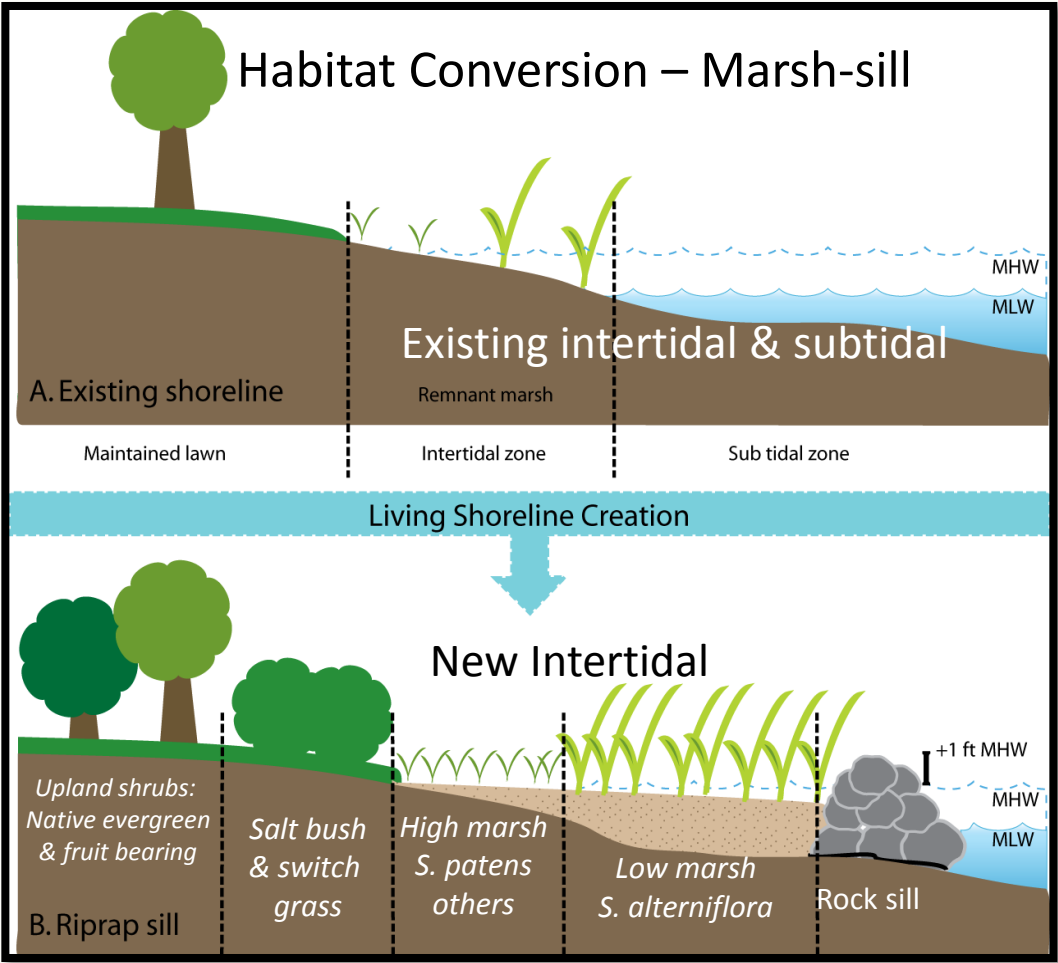
- **Wave attenuation** (*marsh, beach*)
- **Sediment stabilization** (*marsh, beach*)
- **Habitat provision** (feeding & refuge) – shore, wading, and marsh birds, reptiles, fish, & benthic invertebrates
- **Nesting habitat** for turtles (*beaches*)
- **SAV habitat** (*shallows*)
- **High primary production** by benthic algae, marsh, seagrass
- **Nutrient Processing** (uptake/cycling)
- **Decomposition of organic matter**
- **Secondary productivity transferred**
- **Biodiversity**



Living shorelines: effects on ecosystem services

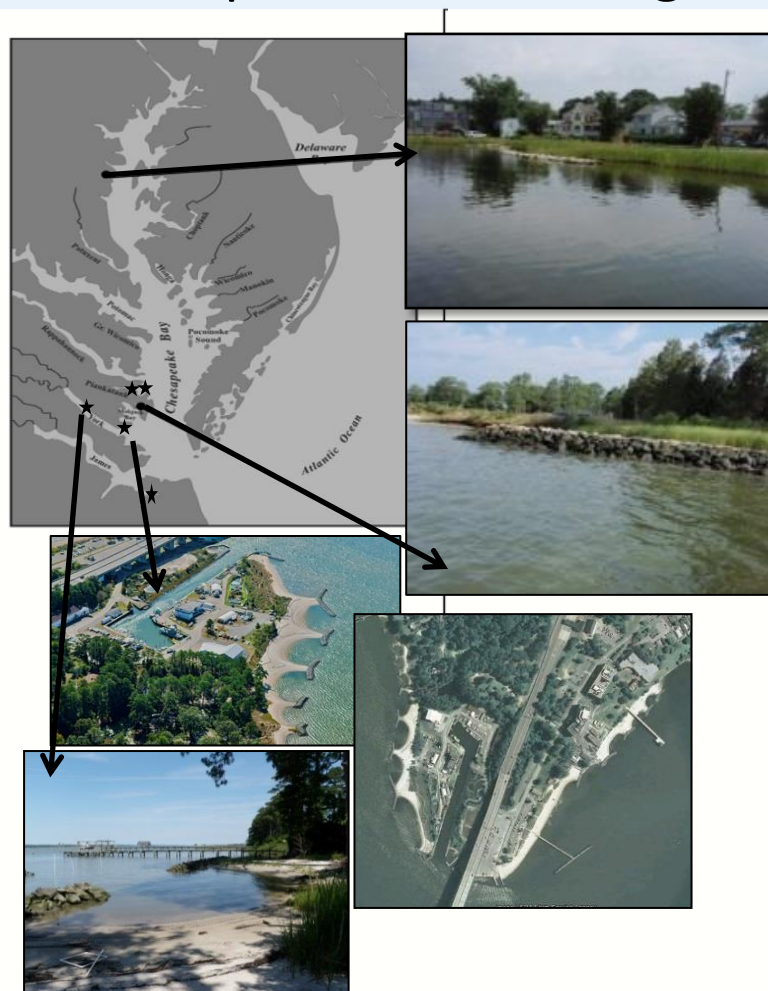
Do living shorelines provide a net ecological benefit?





Are living shorelines enhancing habitat AND does this habitat persist?



Ecological tradeoff: conversion of *nonvegetated wetlands* and *shallow subtidal bottom* to marsh-sill

Habitat provision of living shorelines



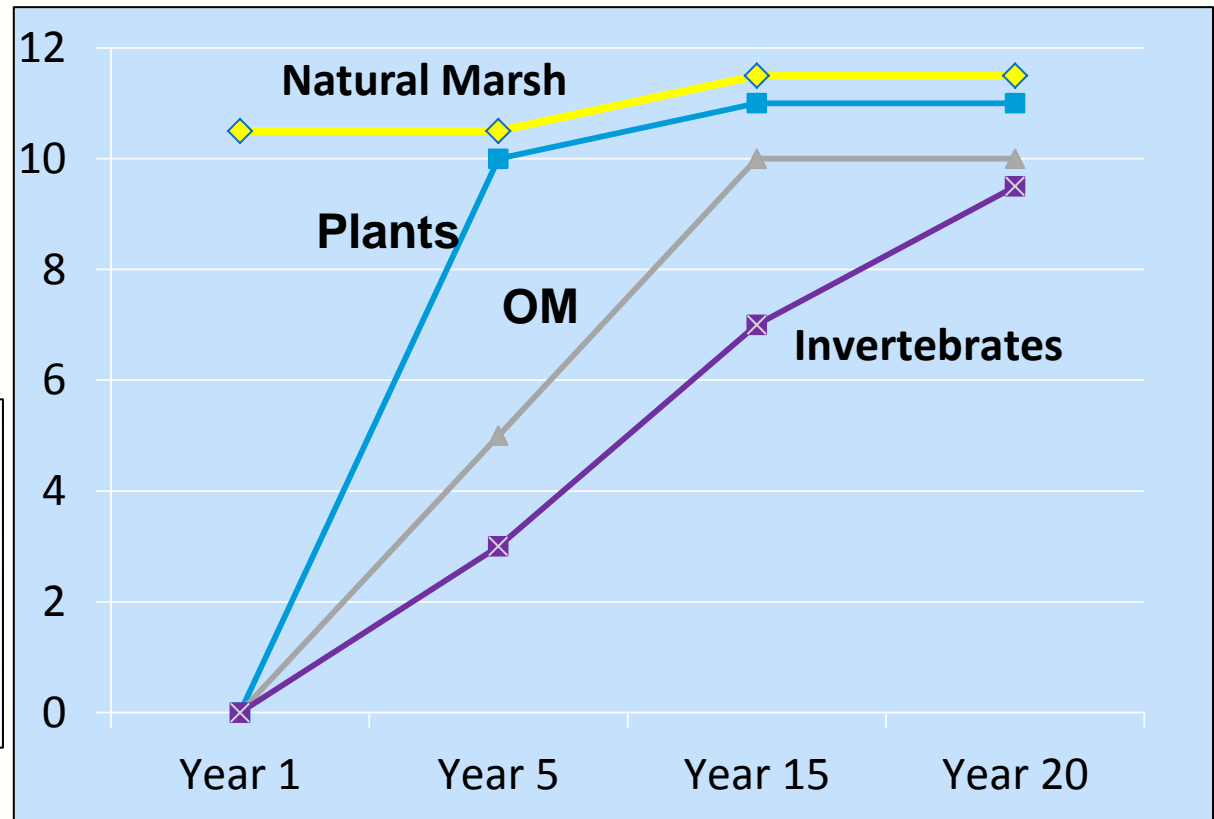
Ecosystem Attribute	Ecosystem Function/Service	Field Measurement
Marsh plant characteristics	Food web support Shl stabilization	Stem counts, height & composition 
Macrobenthic faunal assemblages*	Food web support Nutrient filtration Carbon cycling Bioturbation WQ improvement	Infauna and epifauna abundance, biomass, diversity, structure  
Sediment characteristics*	Food web support Shl stabilization	Sediment cores: OM, Total N, OC & grain size 

*Sampled in intertidal & shallow water zones

Comparative sampling (2010--)
of living shorelines, natural wetlands, and
hardened shorelines

Fundamentals

- Baby created wetlands need time to mature to productive adults
- Some parts develop faster than others
- Not all created wetlands can reach equivalence



Marsh-sills may be following created wetland trajectories of ecosystem development

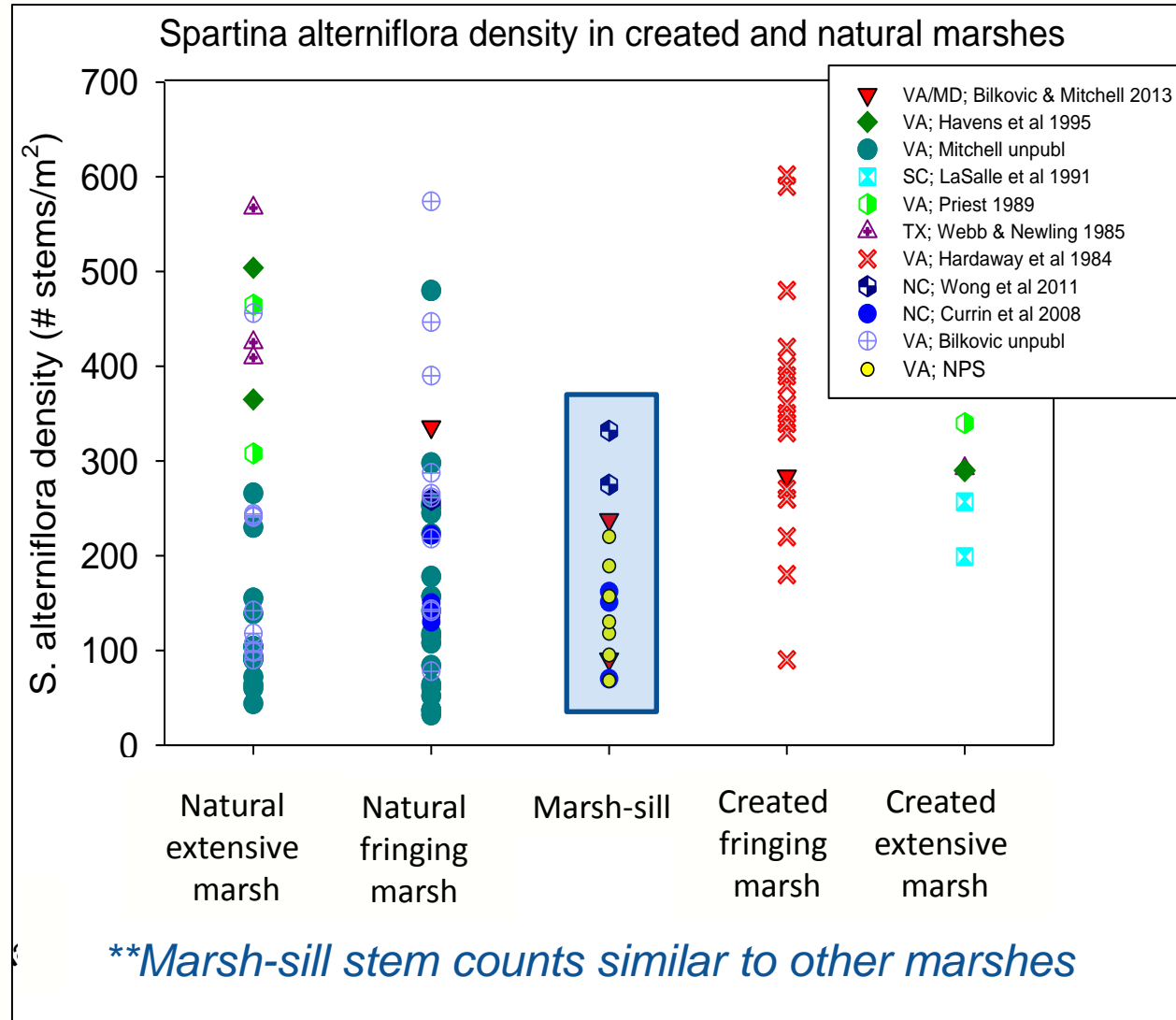
Need long-term monitoring to verify!

Marsh plants



Stems/m²

Marsh-sills: 188 ± 97
Fringe marsh: 199 ± 125
Extensive marsh: 213 ± 154



Sediment characteristics – Organic matter lagging



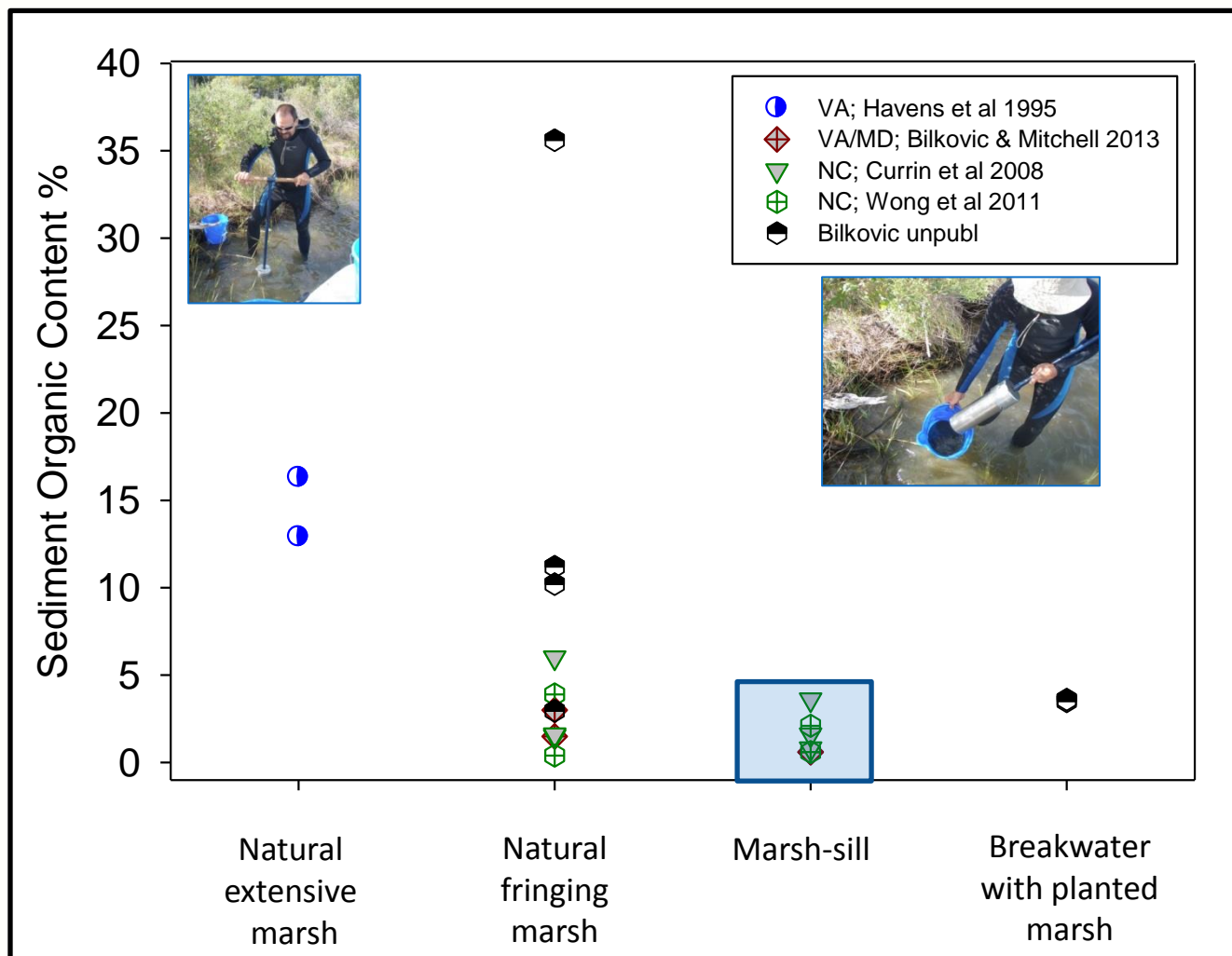
Mean OM %

Marsh-sills: 1.4 ± 1.1

Fringe marsh: 6.8 ± 10.6

Extensive marsh: 14.6 ± 2.4

Breakwater: 3.6 ± 0.1



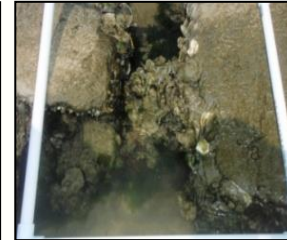
Generally, marsh-sill sediments coarser, and TOC & TN lower than in natural marshes

Ecosystem Service providers

Suspension/filter feeders: feed on algae & detrital particles suspended in the water
-Filter water, improve clarity



Tagelus plebeius
Stout Razor Clam



Oysters -sill



Ribbed Mussels –
marsh

Interface feeders:
can switch



Tellina agilis
Tellin Clam



Macoma balthica
Baltic Macoma Clam



Corophium lacustre
tube-builder amphipod
Favored fish food



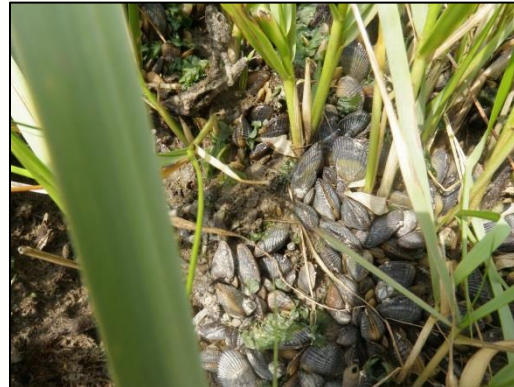
Infaunal Deposit feeders : ingest sediment & digest associated bacteria, microalgae & organic matter
-Mixing of sediment – increase oxygenation & nutrient cycling



Clymenella torquata
bamboo worm

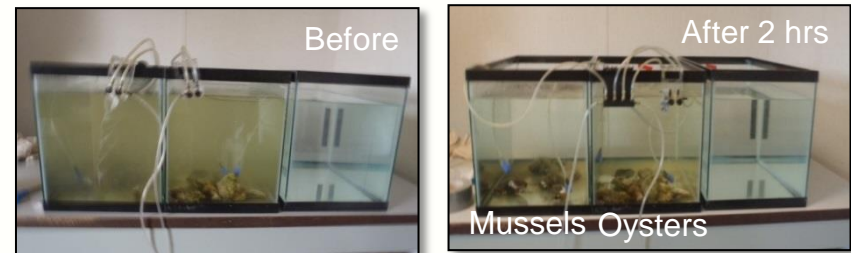
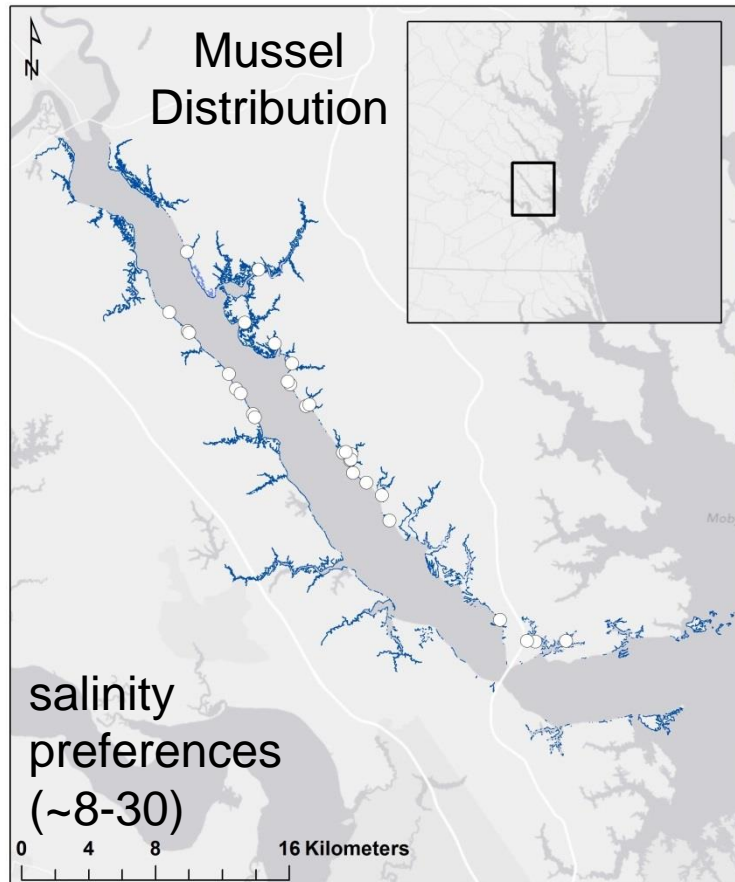


Heteromastus filiformis
worm



Ecosystem Engineers

Filter water
Accrete sediment
Stabilize shoreline
Promote marsh plant growth
Enhance nutrient dynamics



Water Filtration: York River

Ribbed Mussels

- 200 Million mussels
- 25,000 kg of dry weight
- **125 Million liters/hr water filtered**

Oysters

- 10,000 kg biomass
- **65 million liters/hr filtered on York River**

Benthic assemblages differ in marsh-sills from natural marsh



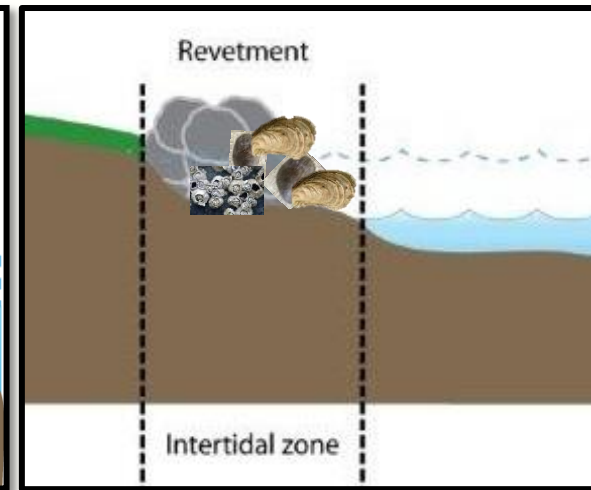
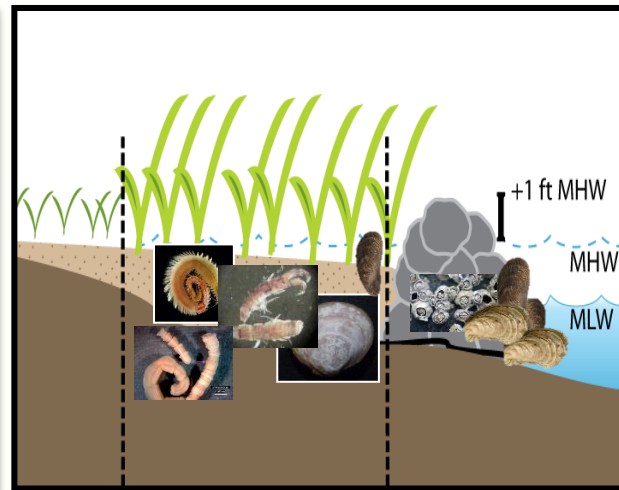
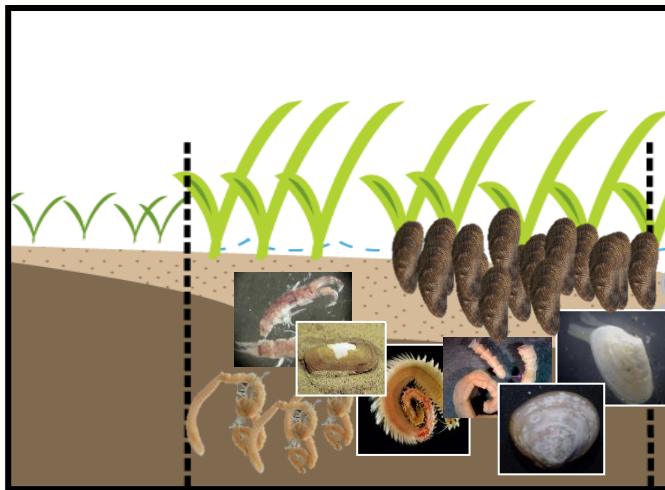
Natural marsh



Marsh-sill



Riprap revetment

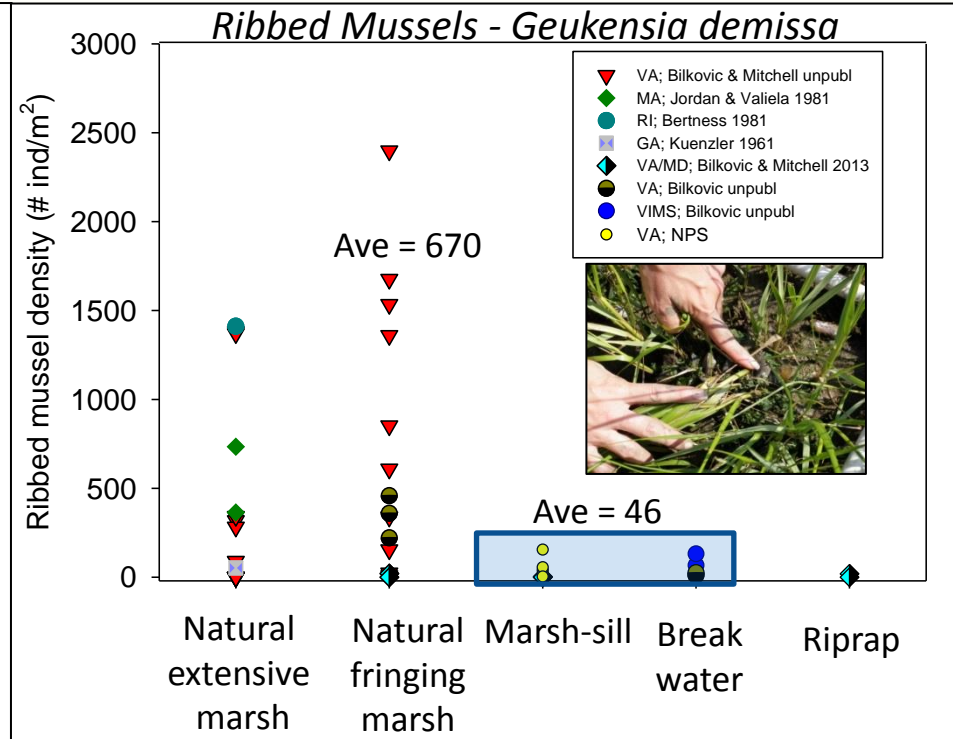
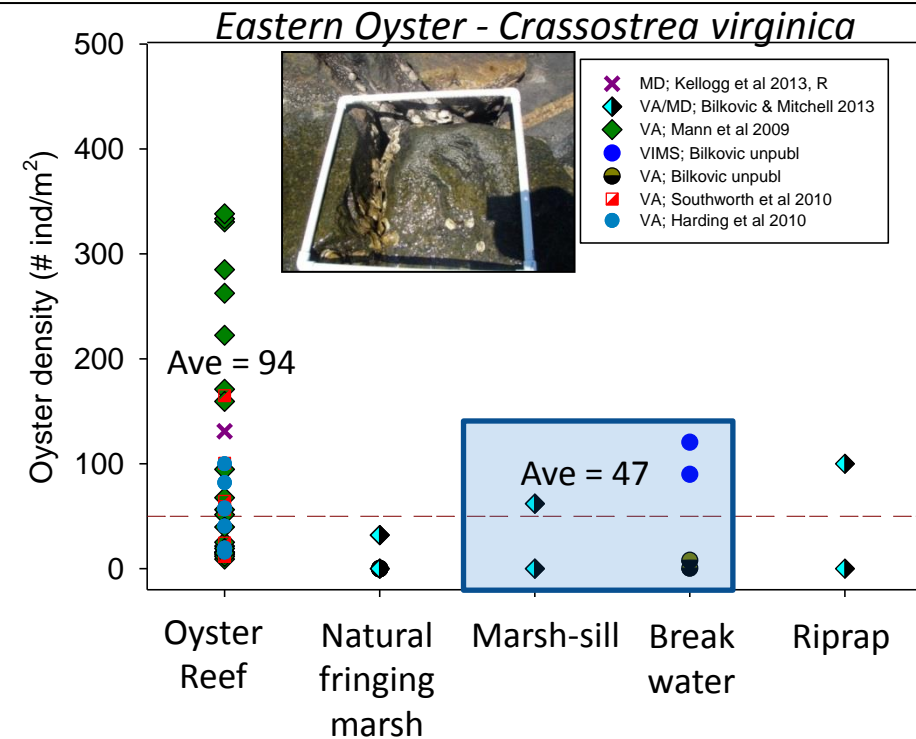


- **High** infauna diversity in intertidal
- Filter and deposit feeders, carnivores, omnivores
- High ribbed mussel density

- **Moderate** infauna diversity in intertidal
- Colonization of macroalgae and epibiota on rock filter-feeders: *barnacles*, *mussel spp*, *oysters*
- High biomass of filter-feeding epibiota at most sites

- **No/Low** infauna Intertidal covered

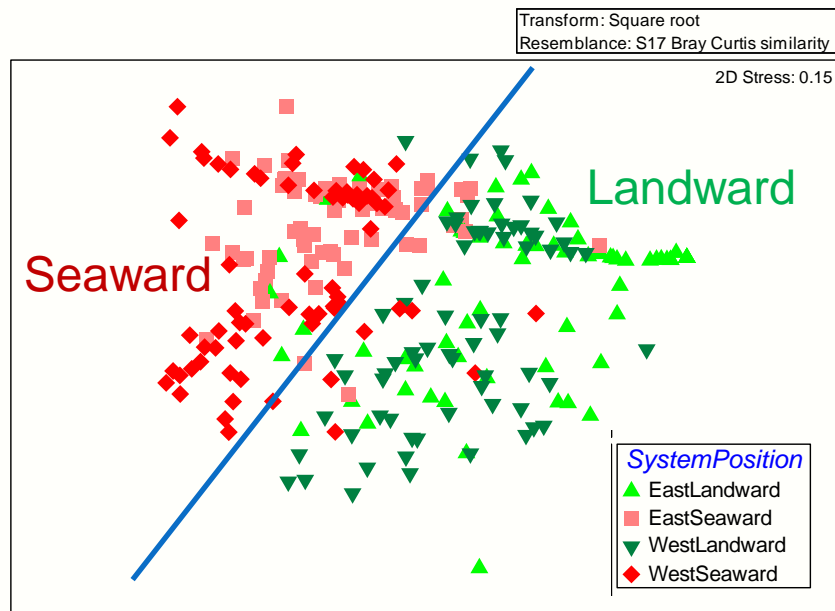
Oysters and mussels observed in lower densities in hybrid living shorelines than natural marshes or reefs



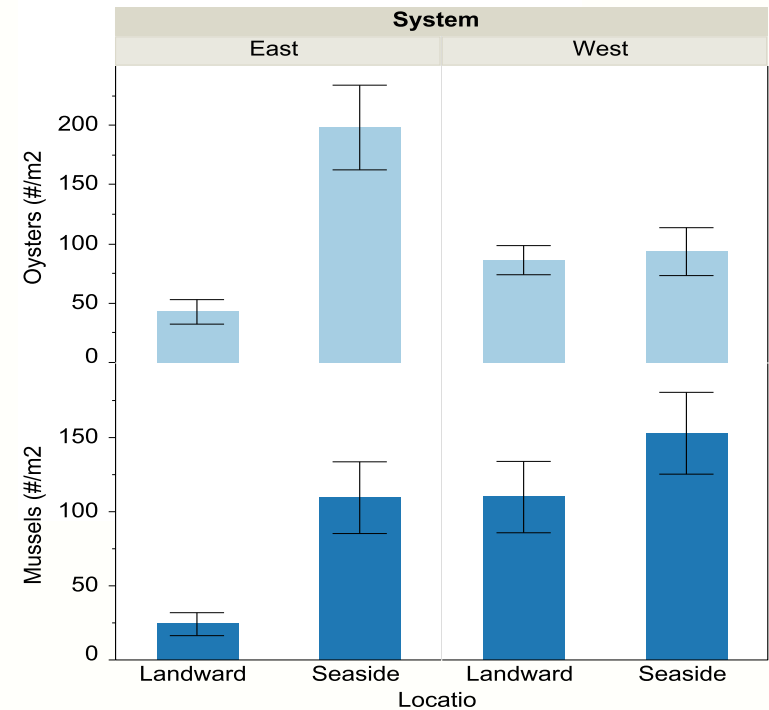
~50 oysters/m² = productive reef
Some sills & breakwaters 'productive',
some are not

Marsh-sills and breakwaters support
lower densities of ribbed mussels than
natural marshes

Colonization of epibiota on breakwater rock structures



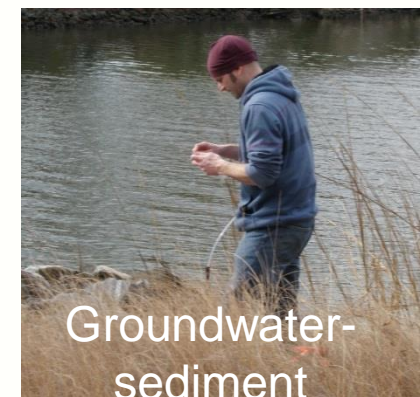
Community comparison



Nutrient reduction by living shorelines



Ways marshes remove nutrients



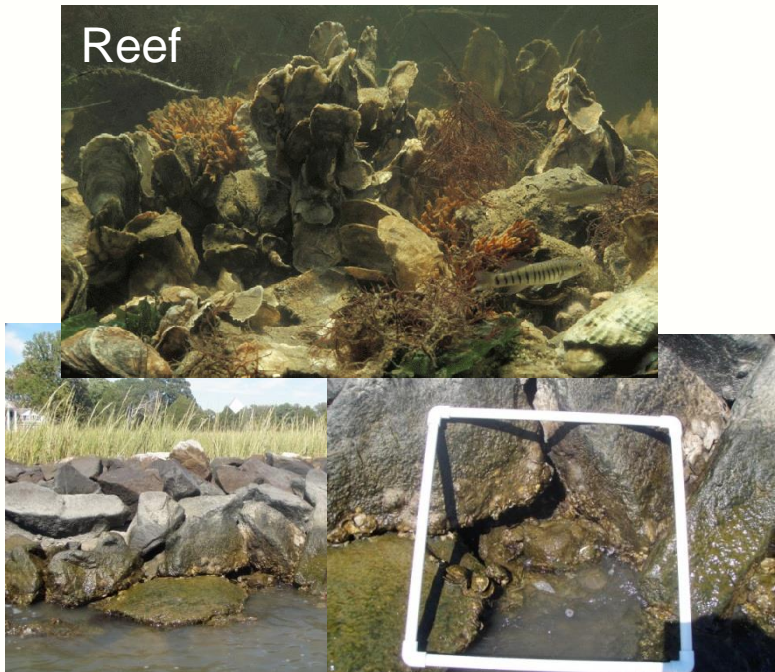


A marsh-sill may provide a **net positive ecological benefit** when the

- only alternative is traditional hardening (bulkhead, riprap)
- sill is likely to be colonized by desirable epibiota
- sill footprint can be minimized & shallow water habitat and tidal access maintained

Points to consider

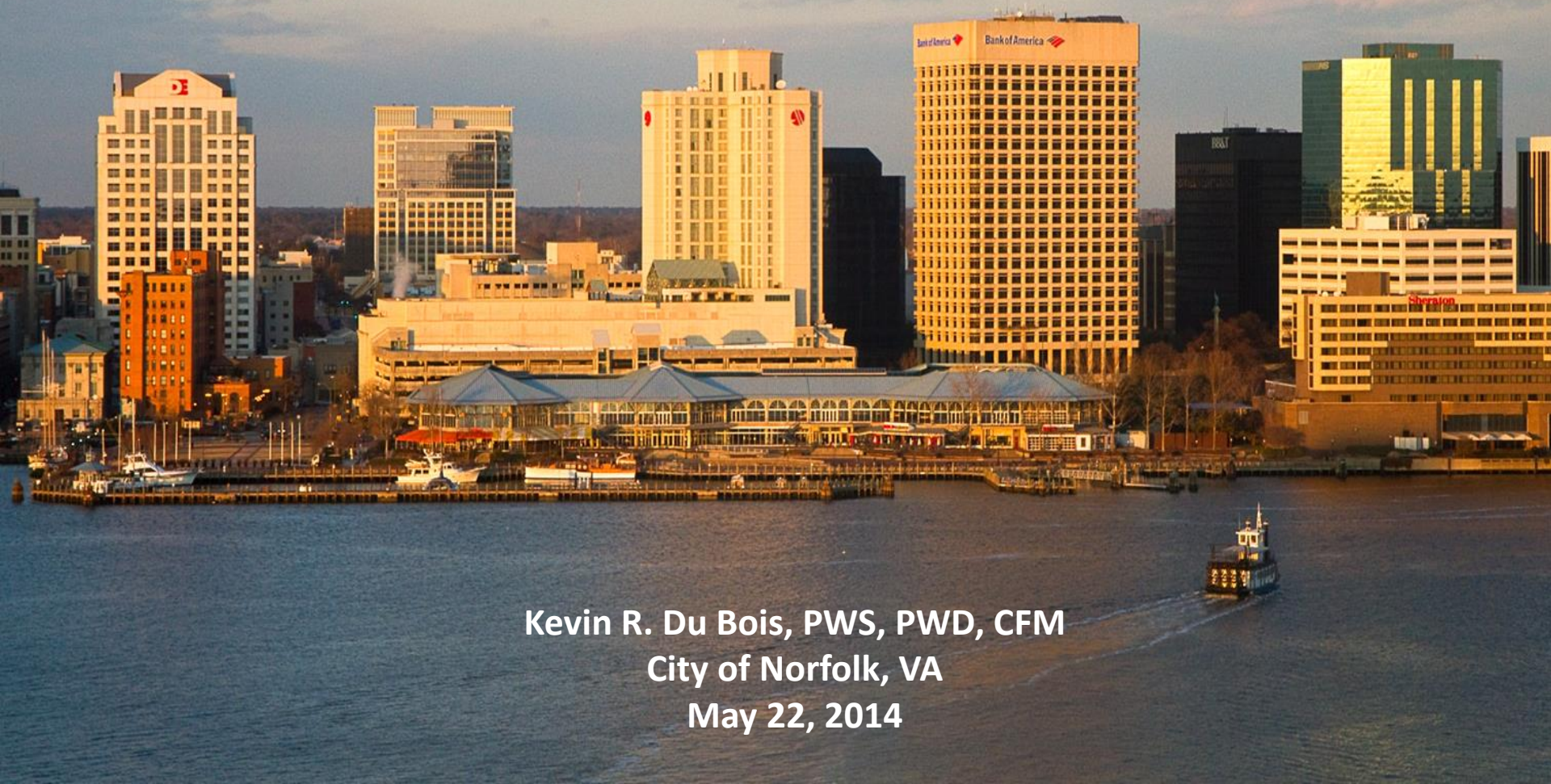
- **Access, Access, Access** – need to ensure LS designs allow animals – mussels, fish, terrapin – tidal access to the marsh surface
- **If system is habitat limited**, stone sills could provide supplemental surfaces for oyster
- **Some functions provided by natural reefs may not be realized for rock substrate**
habitat for reef resident finfish, nutrient cycling



THANK YOU!



Promoting Living Shorelines: Recognizing Barriers and Identifying Solutions



Kevin R. Du Bois, PWS, PWD, CFM
City of Norfolk, VA
May 22, 2014

Barrier: Fear of the Unknown:

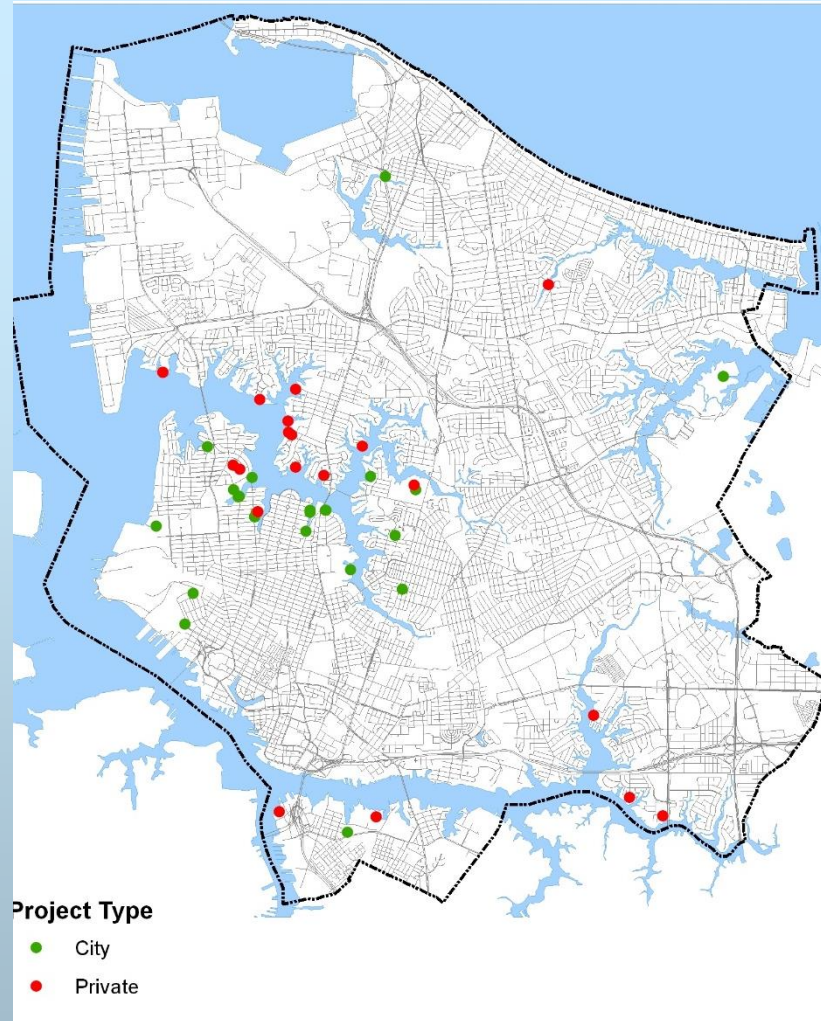
- What does it Look Like?
- How Long Will It Last?



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City of Norfolk

Solution:

Build Demonstration Projects on Public And Private Property



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Solution: Build Demonstration Projects



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Solution:

Point Out The Longevity Of Public Projects



1997



2008



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Barrier: Lack of a VA Living Shoreline Requirement: (State Preference Only)



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City of Norfolk

Solution: Fairfax leads the way in VA

Environmental Stewardship and Permitting Information for Waterfront Property Owners

Prepared by the Planning Division of the Fairfax County
Department of Planning & Zoning, February 2013

As an owner of waterfront property in Fairfax County, you can be a steward of the environment as well as an important member of a partnership to protect our natural resources. This partnership includes the Fairfax County government and other state and federal agencies. Our mutual goal is to preserve the quality of our waterways by preventing erosion and protecting wildlife and vegetation.



Shoreline Erosion, Mason Neck, Fairfax County

Photo by Beth Rado

When are permits required?

- You will need permits to conduct any construction on the shoreline or at the water's edge before you begin work. *For help determining if you need a permit, call 703-324-1380.*
- Make certain that the contractor you choose to help you with your project is licensed to work in the County.

The following activities may result in land disturbance. Land disturbances and related construction activities often require a permit if done in an area that is a *tidal wetland* or is in an area adjacent to a *tidal wetland*. The following types of land disturbing activities and construction projects will require permits:

- Any construction project on, over or adjacent to a tidal body of water.
- Any project in which fill material is placed in or near wetlands such as riprap.
- Construction of bridges, tunnels or roads which may have an impact on wetlands, either tidal or non-tidal.
- Projects designed to protect shorelines in order to minimize erosion such as bulkheads.

“Living Shorelines”: Among all the options, applicants must consider a design that maintains or creates a living shoreline, as an approach for shoreline stabilization, and demonstrate to the Board why a living shoreline approach would not achieve your goals. Properly sited and designed living shorelines will be preferentially permitted over hardened shoreline approaches.



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Solution: Norfolk a close second?



City of Norfolk

Wetlands Board

Annual Wetlands Report
January 1 – December 31, 2013

I. Wetland and Dune Application Review

A rough estimate of permit application activity last year shows that the total number of applications in 2013 was slightly higher (59 this year vs. 53 last year), but that that number of projects reviewed by the Board was slightly less (24 this year vs. 38 last year). This is in part due to the development of a streamlined permitting process for Phragmites management projects that obviates the need for Wetlands Board Review.

A. Total # of Applications Reviewed by Staff: 59

1. Wetland (total) 28
 - a. Non-commercial: 15
 - b. Commercial: 7
 - c. Phragmites Permits: 6 (streamlined process not using a standard JPA. This saves citizens time and money)
2. Dune (total) 2
 - a. Non-commercial: 2
 - b. Commercial: 0
3. No Permit Necessary Reviews: 26
4. Incomplete (not resubmitted in 2013): 3
5. Extension Requests: 2
6. Total number of permits issued: 22

II Impacts to Wetlands:

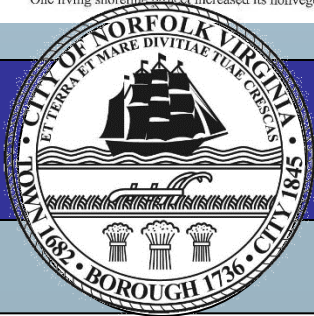
	Vegetated Wetland Impact (sq. ft.)	On-site Compensation (sq. ft.)	In-Lieu Fee Mitigation (sq. ft.)	Non-Vegetated Wetland Impact (sq. ft.)	On-Site Compensation (sq. ft.)
Permit Applications	8,189	11,274	640	24,048	20,867
Violations	21,597	20,857		12,200	12,200

Wetland Impacts Associated with Approved Permits: In 2013, there was a net increase of 3,725 sq. ft. of vegetated wetlands for projects approved by the Board. The approval of five living shoreline projects resulted in 83% of these gains (3,085 sq. ft.). There was a net decrease of 3,181 sq. ft. of nonvegetated wetlands for projects approved by the Board. Living shoreline projects accounted for 1,615 sq. ft. of the loss (48%) by conversion to vegetated wetlands. An additional 1,781 sq. ft. of loss (52%) resulted from bulkhead and revetment projects that converted nonvegetated wetlands to uplands. One living shoreline project increased its nonvegetated wetlands by 215 sq. ft.

71% of all projects that could be built with Living Shorelines were permitted as LS projects in 2013.

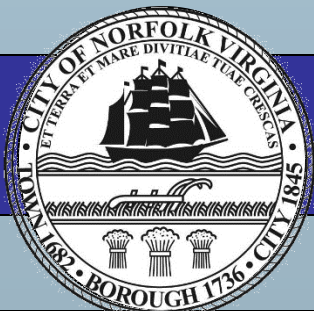
4.26 acres of wetlands were restored (including Phragmites control projects)

3,725 sq. ft. of new tidal wetlands were created.



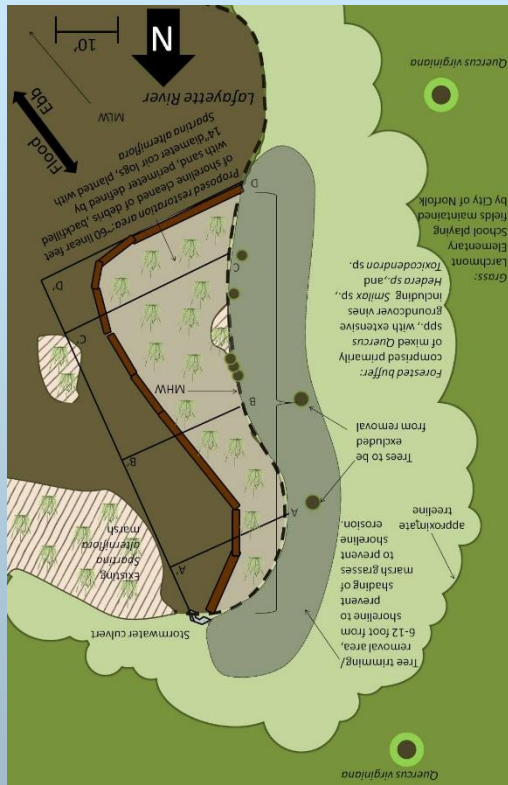
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City of Norfolk

Barrier: Local Wetlands Board Level of Comfort in Approving LS Projects



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Solution: Follow up Presentations to WBs Showing Successes



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Barrier: Living Shoreline Projects Are Uncommon

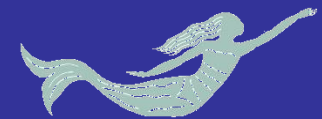


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Solution: Engage NGOs and Citizens to Build LS Projects In All Communities



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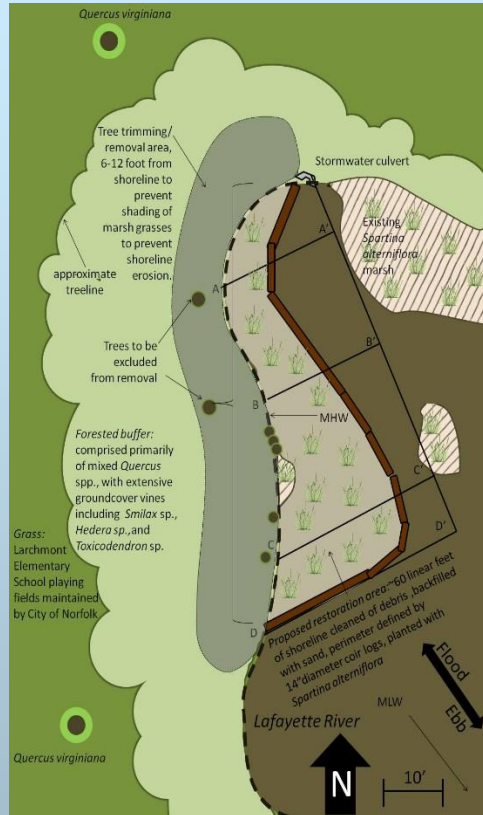


Barrier: Few Experienced Project Designers



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Solution: Train NGOs & College Students



Neighborhood Wetland Stewardship:
Project Management Manual
3rd Edition



Lafayette Wetlands Partnership



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Barrier: Relatively Few Experienced Contractors



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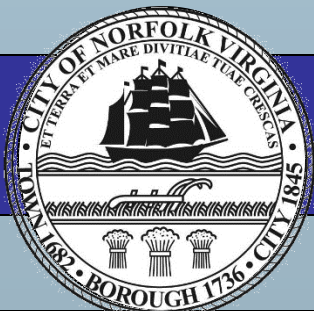
Solution: Spend Time in the Field to Assist Contractors and Troubleshoot



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Barrier: Living Shorelines are Unpopular:

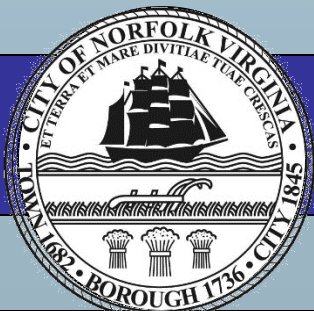
Who's Going to Pay Me to Do
What I Don't Want to Do?



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City of Norfolk

Solution: Investigate TMDL and FEMA
CRS Credits (Section 420(g),
530, 542(f), etc) or Other
Creative Incentives for
Landowners

General Permit – Not Yet
Completed in VA



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Barrier: Living Shorelines, And In Particular Vegetative Wetlands, Are Not Perceived Like Other Types of Landscapes Worthy of Enhancement and Beautification



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Solution: Citizen Education

Native Plants for Wetland Restoration and Enhancement



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Native Plants For Wetland Restoration And Enhancement: A Source Guide

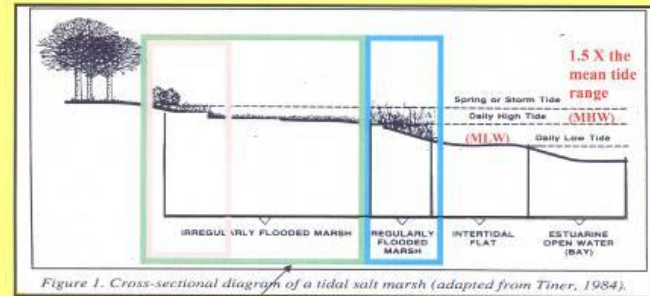


Figure 1. Cross-sectional diagram of a tidal salt marsh (adapted from Tiner, 1984).

Zone Key

Vegetated Wetland - Zone Key

- Intertidal Marsh
- High Marsh
- Brackish Marsh

Common Name

Rose Mallow—*Kosteletskyia virginica*

Large showy blooms. Plant more for aesthetics than wildlife benefits. Survives well in upland

Sources: 1, 4, 6, 10

Plant Height: 2-4'

Sun/Shade Requirements and Blooming Period: Full sun, Jul-Aug

Salinity Regime: 0-10 ppt, plant above mean high water in irregularly flooded areas.



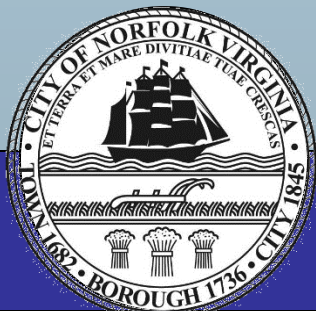
This guide was prepared by Norfolk's Bureau of Environmental Services to provide citizens with information that could be used for wetland restoration or to enhance existing wetlands with native wetlands plants to add beauty and plant diversity.

Updated 8/31/06



Barrier: Common Sense of Purpose
+ Better Coordination Within
the Regulatory Community

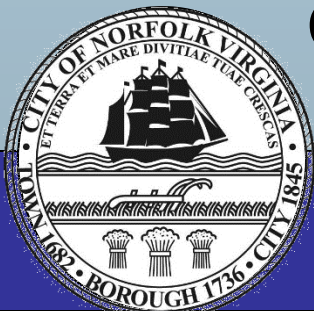
Solution: More Communication
Innovative Approaches



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Challenge: LS General Permit

1. Who's Qualified to Submit?
2. Expedience vs. Quality
3. Structures that break the riparian buffer/aquatic connection are allowed in the expedited GP process (removes an incentive for removal of unnecessary structures)



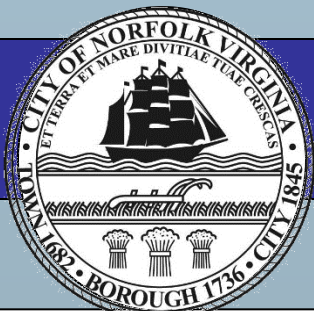
How are LS promoted in Norfolk VA

1. Staff Analysis at Local Wetland Board Permit Hearings
2. Free Wetland Education Workshops
3. Community LS Projects (Lafayette Wetland Partnership)
4. LS Project Signage & Social Media Video
5. CBF VOICES Classes
6. SWS Presentations
7. VAWP Workshops and Presentations
8. ASWM Presentations and Webinars
9. Local Master Gardener and Landscaper Training



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46th Street Terminus



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46th Street Terminus



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46th Street Terminus



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The Hermitage Foundation



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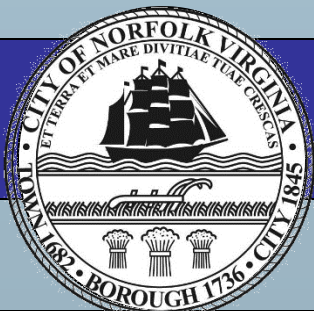
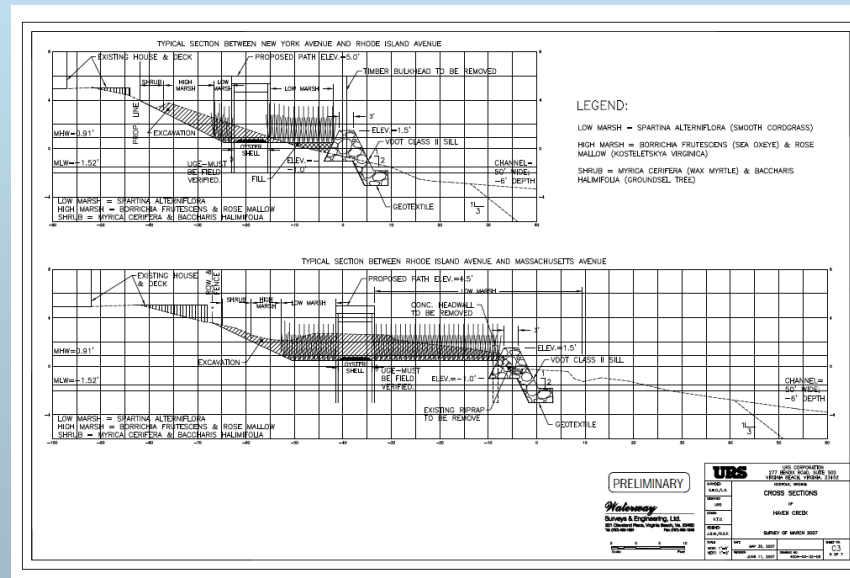
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Holly & Columbus



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Haven Creek



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Colley Bay - Phase 1



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Colley Bay – Phase II



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Questions?



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Living Shorelines in Virginia: Current Practices, Research & Policy

Discussion Topics for Breakout Sessions

Please take a few moments at the beginning of your breakout session to make some notes related to the topics below. All comments are relevant and valuable as we consider how to promote and implement living shorelines in Virginia.

1. Based on discussions today, what are the biggest challenges that need to be addressed FIRST for living shorelines?

Flip Over for Question #2

Living Shorelines in Virginia: Current Practices, Research & Policy

Discussion Topics for Breakout Sessions

2. What are one or two solutions for these challenges?

At the end of the session, please give your notes to the group facilitator.

May 22, 2014

Breakout Group Discussion Summary

Previous workshop experience & feedback suggests that small group discussion opportunities are popular and valuable for networking and learning among coastal managers. Workshop participants were assigned in advance to 1 of 3 stakeholder groups to answer 2 questions about living shorelines. Two discussion groups were needed for each sector, for a total of 6 breakout groups.

These stakeholder groups were chosen because each has a unique role in tidal shoreline management. They also share similar job duties across multiple local governments in coastal Virginia. Peer groups were meant to provide a sense of trust to openly and honestly discuss challenges and solutions inherent with tidal shoreline management. VIMS staff served as discussion moderators & recorders.

Each individual was first asked to record their own ideas about challenges and solutions on a pre-printed, color coded form that was turned in at the end. Open discussions then started with brainstorming and ended with a report out of the top 2 or 3 challenges and solutions for implementing living shoreline projects. Each group selected a volunteer reporter to summarize their findings to the entire audience during a facilitated report out session.

#	Stakeholder Groups
38	Appointed Board Members <i>Local Wetlands, Beach & Chesapeake Bay Boards Representing 18 local governments</i>
50	Staff <i>Representing 15 local governments, 4 state, 3 federal agencies</i>
48	Private <i>Non-profit & for-profit businesses and organizations</i>

1. Based on discussions today, what are the biggest challenges that need to be addressed FIRST for living shorelines?
2. What are one or two solutions for these challenges?

Living Shorelines in Virginia: Current Practices, Research, & Policy Workshop

May 22, 2014

Breakout Group Results

Lively discussions took place in all 6 breakout groups for 1 hour. There were no clear differences between the 3 stakeholder groups, but there were overlapping suggestions. Multiple **cost factors** and **education** topped the list of challenges from all 3 sectors. The collective list of solutions also centers on **how to effectively reach different target audiences** through education & outreach, plus **how to collect and present more information about costs**, i.e. cost comparisons to other methods, up-front construction related costs, long-term maintenance costs, and values, property values with and without living shorelines, values of created habitats.

Another cross-sector suggestion was for tailored outreach programs for different target groups using multiple venues and formats. The groups acknowledged that in order to accomplish this, **social science and social marketing studies** are needed to better understand each target audience and what behaviors, if any, need to be addressed.

A **formal certification training program for landscape professionals and marine contractors** was mentioned by more than one group as a solution to meet demand for professional services and technical expertise in more locations. A certification program could link consumer demand with a supply of qualified professional service providers.

Other reported challenges relate to permitting authority, cross-jurisdictional issues, and permit sequencing. Sharing success stories among localities and formal inter-governmental agreements were other possible solutions. This depends on how well the collective community can **track and monitor project locations & performance**.

Here is a summary table of each group's report out from the breakout group discussion.

Sector Group Reports

Living Shorelines in Virginia: Current Practices, Research, & Policy Workshop

May 22, 2014

	Challenges	Solutions
Board Members 1	Education for multiple stakeholders	Outreach programs targeted to stakeholder groups
	Cost factors, installation & maintenance	Permit review timeframe change: more time for Board review & modifications Innovative cost savings to alleviate burden for applicants
Board Members 2	Lack of education	Education programs tailored for different groups, Use multiple formats, e.g. traditional documents, teleconferences, social media, bi-lingual, etc. Set clear expectations of the Board, adopt policies, mandate tool use
	Unwillingness, lack of motivation	
Staff 1	Costs – are the actual costs higher?	Cost matrix with short- & long-term costs calculated; possibly like car ownership costs
	Relative costs of living shorelines	Training & education for homeowners, contractors separately
	Need to change perception of waterfront property owners & contractors	Contractor certification program
Staff 2	On-going maintenance, 2 nd home owners	
	Incentives & costs	Value engineering, cheaper designs Homeowner sweat equity
	Cross-Jurisdictional	Share success stories Additional communication, formal

Living Shorelines in Virginia: Current Practices, Research, & Policy Workshop

May 22, 2014

Challenges		Solutions
	Education/outreach	regulatory partnerships among localities Change permit sequencing, local then state then federal Partnership-volunteer networking More technical assistance
Private 1	Lack of education re: benefits	More workshops, hands-on experiences, train local staff to be trainers
	Lack of skilled contractors & references	Contractor certification program
	Costs	Mitigation bank funds used for large swaths of living shorelines, state-owned
	Technical oversight, access to services	Reinstate VIMS advisory program, require monitoring for feedback
Private 2	Education of stakeholders & marketing	BMP type education program, clearinghouse model
	Costs	Raise awareness & make incentives more accessible, economic & regulatory incentives
	Technical expertise, availability in rural areas	Certification program

Living Shorelines in Virginia: Current Practices, Research, & Policy Workshop

May 22, 2014

Workshop Participants

Government Agencies		
20 Local Governments		State & Federal
<i>City of Hampton</i>	<i>Charles City County</i>	<i>VA Coastal Zone Management Program</i>
<i>City of Newport News</i>	<i>Fairfax County</i>	<i>VA Institute of Marine Science</i>
<i>City of Norfolk</i>	<i>Gloucester County</i>	<i>VA Game & Inland Fisheries</i>
<i>City of Poquoson</i>	<i>Isle of Wight County</i>	<i>VA Marine Resources Commission</i>
<i>City of Portsmouth</i>	<i>James City County</i>	<i>Northern Neck Soil & Water Conservation District</i>
<i>City of Suffolk</i>	<i>King George County</i>	<i>U.S. Army Corps of Engineers, Norfolk District</i>
<i>City of Virginia Beach</i>	<i>Lancaster County</i>	<i>U.S. Air Force, Langley AFB</i>
<i>Town of Smithfield</i>	<i>Mathews County</i>	
	<i>New Kent County</i>	
	<i>Stafford County</i>	
	<i>Westmoreland County</i>	
	<i>York County</i>	

Wetlands, Beach & Chesapeake Bay Boards some with more than one member:

- 1 Charles City County Wetlands Board 2
- 2 City of Hampton Wetlands Board 6
- 3 City of Norfolk Wetlands Board 5
- 4 City of Poquoson Wetlands Board
- 5 City of Portsmouth Wetlands Board 4
- 6 City of Suffolk Wetlands Board
- 7 Fairfax County Wetlands Board 2
- 8 Gloucester County Wetlands Board 3
- 9 Isle of Wight County Wetlands Board
- 10 James City County Wetlands Board
- 11 King George County Wetlands Board
- 12 Lancaster County Wetlands Board 3
- 13 Mathews County Wetlands Board 2
- 14 Middlesex County Wetlands Board
- 15 New Kent County Wetlands Board 2
- 16 Stafford County Wetlands Board
- 17 Westmoreland County Wetlands Board
- 18 York County Wetlands Board

Living Shorelines in Virginia: Current Practices, Research, & Policy Workshop

May 22, 2014

Workshop Participants

Non-Profit Organizations	Businesses
<i>Elizabeth River Project</i>	<i>ARCADIS</i>
<i>Friends of the Rappahannock</i>	<i>Bay Environmental, Inc.</i>
<i>Lafayette Wetlands Partnership</i>	<i>Bayshore Design, LLC</i>
<i>Lynnhaven River NOW</i>	<i>Christian & Barton, LLP</i>
<i>Nansemond River Preservation Alliance</i>	<i>E & B Oil Company, Inc.</i>
<i>The Nature Conservancy</i>	<i>Falling Springs, LLC</i>
<i>The Wetlands Project</i>	<i>Garden & Forest Consulting</i>
<i>Wetlands Watch</i>	<i>Moffatt & Nichol</i>
<i>Northern Neck Master Gardeners</i>	<i>Professional Construction Consultants, LLC</i>
<i>Hampton Master Gardeners</i>	<i>ReadyReef, Inc.</i>
<i>Chesapeake Master Gardeners</i>	<i>Riverworks</i>
<i>Concerned citizens</i>	<i>Roth Environmental</i>
	<i>Wetland Studies & Solutions, Inc.</i>

#	Stakeholder Groups
38	Appointed Board Members <i>Local Wetlands, Beach & Chesapeake Bay Boards Representing 18 local governments</i>
50	Staff <i>local, state, federal government agencies</i>
48	Private <i>non-profit & for profit businesses and organizations</i>

Total = 136

Living Shorelines in Virginia: Current Practices, Research, & Policy

Thursday, May 22, 2014

Virginia Institute of Marine Science

Gloucester Point, Virginia

Workshop Evaluation

What is your affiliation?

_____ Wetland Board Member

_____ Federal Agency Staff

_____ Other Local Board Member

_____ Consultant / Contractor / Agent

_____ Elected Official

_____ Non-Profit / Community Organization

_____ Local Government Staff

_____ Other (please specify) _____

_____ State Agency Staff

What was the best part of this workshop to you?

How could the workshop be improved?

What topic(s) would you like to see future workshops cover?

What applied research topic(s) or question(s) would you like VIMS to address?

Other Comments (use back of page also):

Please return evaluation to the registration table or mail to:
Center for Coastal Resources Management
Virginia Institute of Marine Science
PO Box 1346, Gloucester Point, VA 23062

Although not a final product deliverable, CCRM continues to provide other training.

Regional Training – CCRMP & Shoreline Best Management Practices

CCRM continues to raise awareness and provide orientation to new CCRM tools and guidance provided through the Comprehensive Coastal Resources Management Portal (CCRMP). Beginning in 2012, CCRM started developing portals for each Tidewater locality. The portals are gateways to resources that address data gaps, shoreline best management practices, and sea level rise issues at the local level. Each portal links to comprehensive shoreline data, maps displaying management recommendations, and decision support tools. Each year, CCRM will release more local portals. Two different groups are targeted for training – coastal planners & shoreline managers. The localities to be targeted for CCRMP training were those with recently completed shoreline and tidal marsh inventories and shoreline management model results.

- 10/03/13 – HRPDC Joint Environmental Committee (18)
- 10/14/13 – City of Newport News (11)
- 10/16/13 – Northampton County Local Wetland Board (10)
- 02/05/14 – Mathews Local Wetland Board (8)
- 04/03/14 – Charles City, York, Suffolk, Northampton, & Poquoson (11)
- 04/17/14 – Prince William Staff (6)
- 06/09/14 – Prince William Local Wetlands Board (6)

Three Local Wetland Board Training classes introducing our Coastal Best Management Practices education program were completed.

- 11/07/13 – Charles City, New Kent, James City, and King William (40)
- 11/19/13 – West Point (8)
- 04/17/14 – Fairfax (10)

In addition, four trainings and eight Teaching Marsh tours for general audiences of engaged citizens were presented.

- 10/15/13 – Nansemond River Preservation Alliance – Shoreline Inventory & TMI (80)
- 05/01/14 – Northern Neck Master Naturalists – Coastal Management & Policy (15)
- 05/31/14 – Tidewater Oyster Growers Association – Living Shorelines Workshop (50)
- 07/23/14 – Hampton Master Gardeners – Shoreline Landscapes (45)
- Teaching Marsh Tours (189 combined)

On-Line Course for Shoreline Best Management Practices

The Center continues to make available an on-line course dedicated to shoreline best management practices. This dynamic course launched in April 2013, is free and available to anyone that is interested. It has eleven modules, each covering a different topic made up of a video and follow-up quiz. Participants can work through the course at their convenience. The Wetlands Program continues to monitor course registration and participation, answer questions about content, troubleshoot technical difficulties, and issue certificates of completion.

[http://ccrm.vims.edu/education/shoreline BMP/index.html](http://ccrm.vims.edu/education/shoreline_BMP/index.html)

- 14 certificates of completion were issued this grant period.

Publications

Center staff produces two newsletters – the *Virginia Wetlands Report* and *Rivers & Coast*. The *Virginia Wetlands Report* informs readers of near-shore environmental science and related issues to influence better tidal shoreline decisions, and serves to announce upcoming workshops and educational opportunities. The *Rivers & Coast* newsletter covers one relevant topic in more detail through the use of charts, graphs, maps and photos in an 8-page color publication. Both newsletters are mailed to all local wetlands board members and their staff. Additionally, they are available online and announced through CCRM's e-newsletter to approximately 2000 email addresses which include local and state agency personnel, General Assembly members, and interested private citizens. CCRM e-News provides the reader with reminders, and quick links, by summarizing a variety of issues that support integrated management of coastal zone resources, and by pointing the reader to more detailed information on our website.

Virginia Wetlands Report

- Spring 2014, Vol. 29, Issue 1

Living Shorelines Updates: 2013 Summit, New Demo Sites, & Upcoming Workshop

http://ccrm.vims.edu/publications/publications_topics/vwr/vwr_2014_spring.pdf

Rivers and Coast

- Spring 2014, Vol. 9, No. 1

New Guidance for Local Wetlands Boards

<http://ccrm.vims.edu/publications/pubs/rivers&coast/RC414.pdf>

- Summer 2014, Vol. 9, No. 2

Living Shoreline Implementation: Challenges & Solutions

<http://ccrm.vims.edu/publications/pubs/rivers&coast/RC914.pdf>

CCRM e-Newsletter

- October 2013 (Adaptive Planning for Flooding Conference, *Rivers & Coast*, and Living Shorelines Summit)
- March 2014 (Workshop Save-the-date, *VA Wetlands Report*, Ecological Engineering journal article)
- April 2014 (Workshop Registration Reminder, *Rivers & Coast*)
- May 2014 (American Wetlands Month, Living Shoreline Webinar)
- September 2014 (*Rivers & Coast*, CCRMP Update, CCRM Summer Research)

New Living Shoreline Projects & Partnerships

Grant-funded & public demonstration sites in Virginia

Recently Constructed

- **Colley Bay** - City of Norfolk, Lafayette Wetlands Partnership, ODU students
- **Phoebus/Mugler Bridge** – City of Hampton
- **Occohannock on the Bay Camp & Retreat Center** - United Methodist Church, The Nature Conservancy, Eastern Shore Resource Conservation & Development Council, VIMS

Watch a video about this project <http://www.youtube.com/watch?v=FilWVIRo0Jw>

Coming Soon

- **Sleepy Hole Park** - City of Suffolk
- **Johns Point Landing** - Gloucester County, VIMS
- **Chincoteague National Wildlife Refuge** – US Fish & Wildlife Service, The Nature Conservancy, VMRC

Is your new demonstration project not on this list? Would you like to know about other existing demonstration sites? Contact Karen Duhring (karend@vims.edu) with project information or any questions.

Recent Living Shorelines Research

- Dr. Donna Bilkovic of the VIMS Center for Coastal Resources Management continues to lead a study analyzing ribbed mussels, oysters, barnacles, and other organisms that grow on sills and breakwaters. Dr. Bilkovic said, “it is imperative to understand the ecological consequences of converting existing coastal habitat to artificial substrate given the extensive and ongoing practice of hardening coastlines.” This includes structures associated with living shoreline projects to better understand their ecological tradeoffs. Particularly lacking is information on seasonal changes in species composition and the abundance and prevalence of non-native species on offshore breakwaters.



Living shorelines research in control marshes (above) and at breakwaters (upper right). CCRM Staff photos

- An ecological monitoring project has started at the new Johns Point Landing public demonstration site in Gloucester County. Marsh vegetation and infaunal communities will be monitored before and after living shoreline construction and compared to natural control marshes in the vicinity. This study will also document ribbed mussel and oyster recruitment and growth in experimental oyster bags at the living shoreline.
- Another research project getting underway in 2014 will investigate how created tidal marshes can possibly reduce non-point source pollution. Researchers from VIMS and the College of William & Mary are collaborating to estimate rates of nitrogen, phosphorus, and sediment removal by created tidal marshes of living shorelines that can serve as a BMP approach for use in meeting Chesapeake Bay Total Maximum Daily Load (TMDL) goals.

The Virginia Wetlands Report is an annual publication of the Wetlands Program at the Virginia Institute of Marine Science of the College of William and Mary. To subscribe to this newsletter, please contact:

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Gloucester Pt., VA 23062
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CCRM Director: Dr. Carl Hershner

Produced by: Karen Duhring

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VIMS WILLIAM & MARY
VIRGINIA INSTITUTE OF MARINE SCIENCE

Tidal Wetlands News & Events

25th Annual Environment Virginia Symposium – “Collective Impact: Working Together to Create a Positive Environmental Legacy.” April 8-10, 2014. Lexington, VA. <http://www.vmi.edu/Content.aspx?id=10737419910>.

VIMS Marine Science Day Open House. May 17, 2014 10 am – 3 pm. Gloucester Point campus. Fun-filled event for the whole family including guided tours of the Teaching Marsh. Free. This year’s theme is Bioluminescence. <http://www.vims.edu/public/msd/index.php>

7th National Summit on Coastal and Estuarine Restoration - Inspiring Action, Creating Resilience. November 1-6, 2014. Sponsored by Restore America’s Estuaries & The Coastal Society. Gaylord Hotel & Convention Center, Washington DC. Includes a dedicated track for living shorelines. <http://www.estuaries.org/summit>

New Report - Tidal Wetland Restoration Could Offset Impacts of Climate Change. The potential carbon sequestration benefits of restored coastal wetlands is a hot topic. A new report by Restore America’s Estuaries from Washington’s Puget Sound shows that restoring tidal wetlands will help remove tons of carbon dioxide from the atmosphere. Major climate mitigation benefits are expected if wetlands are restored as planned. <http://www.estuaries.org/landmark-coastal-blue-carbon-report-released.html>

Virginia General Assembly 2014 – Tidal Wetlands Related

HB 911 / SB 569: Living Shorelines General Permit

Requires regulations for the issuance of general permits for living shoreline projects to include an expedited review process. The bill allows construction of such projects under the tidal wetlands and coastal primary sand dunes ordinances. Passed both House & Senate unanimously.

HB 572 : Wetlands Zoning Ordinance; local credit for in-lieu fees

Adds to the standard coastal wetland zoning ordinance a requirement that a local wetlands board give a permit applicant credit toward local in-lieu fees in the amount of the fee he has paid to the Virginia Wetlands Restoration Trust Fund or another dedicated wetlands restoration fund. Passed House unanimously, scheduled for Senate vote.

HB 390 / SB 209: Sand Replenishment

Provides that when sand or other material is placed on state-owned bottomlands seaward of the mean low-water mark in order to provide beach nourishment or storm protection or as a result of a dredging project, the deposited material shall be deemed accretion. The public has a right of use and maintenance of the area as previously existed on the adjacent land above the mean low-water mark. Bill passed Senate and House (SB209ER). This subsection is retroactively effective beginning January 1, 2009.

HJ 16 / SJ 3: Recurrent Flooding; joint subcommittee established

Establishes a 15-member joint subcommittee to formulate recommendations for the development of a comprehensive and coordinated planning effort to address recurrent flooding.

New Guidance for Local Wetlands Boards

The Tidal Wetlands Act was passed “...*to preserve and prevent the despoliation and destruction of wetlands while accommodating necessary economic development in a manner consistent with wetlands preservation.*” (Code of Virginia § 28.2-1301). The importance of natural shoreline habitats was re-affirmed with the passage of the Living Shorelines Act in 2011. Together these laws codify a preference for the use of natural features for erosion protection along Virginia’s shorelines.

The administration of the Wetlands Act by Local Wetlands Boards requires a process of public interest review. Tidal wetlands are a public trust resource held in common by all Virginians whether or not they live on the water. Local Boards have an obligation to protect wetlands under the Wetlands Act and promote their use for erosion protection under the Living Shorelines Act. Boards operate under the adoption of the model ordinance within the Tidal Wetlands Act. As such, issuance of a tidal wetlands permit should capture both the local and State interests in the decision. From an administrative perspective, the locally issued permit often serves as the only State permit for shoreline activities.

This issue of *Rivers and Coasts* recommends new procedures for Local Wetlands Boards in their review of tidal shoreline permit applications. Conforming to these procedures ensures Board decisions are consistent with the new policy established by the Living Shoreline Act.

These recent amendments to the Code of Virginia identify living shorelines as the Commonwealth’s preference for tidal shoreline erosion control. The legislation directs the Virginia Marine Resources Commission (VMRC), the Virginia Institute of Marine Science (VIMS), the Department of Conservation and Recreation (DCR) and local governments to develop guidance and/or revise comprehensive plans to consider more ecologically based approaches to erosion control. VMRC and VIMS are actively engaged in the evolution of this guidance. This change reflects a desire on the part of the state, coastal managers and regulators to implement an integrated coastal management approach. The Center for Coastal Resources Management (CCRM) at VIMS has developed a website, the Comprehensive Resource Management Portal (CCRMP), where localities and Board members can find guidance termed “Shoreline Best Management Practices (BMPs)” (<http://ccrm.vims.edu/ccrmp/index.html>).



A living shoreline

For a better understanding, we begin with a hypothetical scenario: (continued on page 2)

Rivers & Coast is a biannual publication of the Center for Coastal Resources Management, Virginia Institute of Marine Science, College of William and Mary. If you would like to be added to or removed from the mailing list, please send correspondence to:

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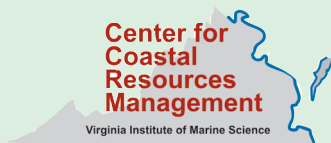
CCRM Director: Dr. Carl Hershner

Contributing Authors: Marcia Berman
Pamela Mason

Layout: Ruth Hershner

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Virginia Marsh has submitted an application to her Local Wetlands Board to construct a 200 foot linear revetment along her shoreline. The project impacts 200 square feet of non-vegetated tidal wetlands. Virginia's property is located in a sheltered cove which rarely experiences high waves. Some minor wave action, possibly from boat wake activity, has contributed to erosion at the base of the 10 foot tree lined bank. Neighbors on either side both have well developed fringe marshes, and their shorelines are relatively stable. Neither adjacent property has an erosion control structure. Figure 1 is a high resolution image of the site showing Virginia's property in the red box, and the location of fringe marshes delineated in white. The Local Wetlands Board must now determine whether to issue a permit for the revetment construction. What steps should they take in their review?



Figure 1. Virginia Marsh's property shown in red.

Local Wetland Board Permit Review Process

- Consult the Comprehensive Coastal Resource Management Portal for guidance;
 - Use the Shoreline Management Model if available for your locality OR
 - The Decision Tree if the Model is unavailable
- Review the recommended Shoreline Best Management Practices
- Request additional justification if the applicant does not propose to use the recommended Shoreline BMP
- The justification must be consistent with a small set of special circumstances (see page 5)

More about “Shoreline Best Management” Practices

- 1) In 2011 the General Assembly passed legislation that states it is “...*the policy of the Commonwealth to support living shorelines as the preferred alternative for stabilizing tidal shorelines*”. Local governments, inclusive of commissions and boards, should be initiating policy and protocols internally that are consistent with the State’s policy and regulate activities along tidal shoreline in a compliant manner.
- 2) While there are no laws that prohibit the construction of traditional structures such as revetments, the new policy was enacted because legislators recognize that traditional erosion control practices have cumulative and secondary adverse impacts to the environment. *Coastal ecosystems are a public trust resource, and local boards, as stewards of the environment, have an obligation to protect these coastal environs.*
- 3) CCRM has researched conditions under which alternative treatment options, also referred to as living shoreline approaches, will offer equivalent erosion control protection. In these settings, *the use of structures such as bulkheads or revetments should be viewed as excessive armoring, and the cost to the environment outweighs the benefit to the property owner*. A suite of preferred approaches are presented in Table 1. At any given site, one or two treatment options may be appropriate and recommended. This is typical where some modification of the bank is necessary (e.g. forest management) to improve growing conditions for planting marshes in the intertidal zone (e.g. plant marsh with sill).

Table 1. Shoreline Best Management Practices

Shoreline BMP Treatment Option	Description
Area of Special Concern	Examples include marinas, dredged canals
Land Use Management	Modify upland uses; relocate or modify infrastructure
Forest Management	Enhance forest condition by pruning and removing dead matter
Enhance/Maintain Riparian Buffer	Preserve existing vegetation within 100 feet of bank
Enhance Riparian/Marsh Buffer	Preserve and enhance vegetation stabilization potential between the mid-tide level to within 100 feet of the bank.
Grade Bank	Reduce slope steepness for wave run-up and improved growing conditions
Enhance/Maintain Marsh	Preserve and enhance low and high tide marsh vegetation for wave attenuation
Widen Marsh	Increase marsh width to improve wave attenuation
Widen Marsh/Enhance Buffer	Blended riparian and/or tidal marsh vegetation that includes planting to increase width and modifications to the riparian area
Plant Marsh with Sill	Existing or planted marsh supported by a low revetment placed offshore of the marsh
Enhance/Maintain Beach	Preserve existing beach
Beach Nourishment	Place sand on beach to increase beach width
Enhance Riparian/Marsh Buffer or Beach Nourishment	For shorelines where buffers and beaches exist enhance the buffer if needed. If buffer does not require enhancement then

4) Boards and staff should conduct an on-site project assessment using the Decision Trees available here: <http://ccrm.vims.edu/ccrmp/index.html> under the heading, “**Regional Shoreline Management Guidance - all Tidewater Localities**”. Decision Trees were originally developed to be used for an on-site assessment. If on-site assessment is not possible, information about conditions at a site can be gathered in a number of ways:

- o Requested from the applicant
- o Researched from online data sources such as the county’s Shoreline Inventory, if available: http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/index.html
- o Researched from online data sources such as the Shoreline Managers’ Assessment Mapper: http://139.70.26.131:8008/ShorelineAssessmentMapper_SL/ShorelineAssessmentMapperTestPage.html

5) CCRM has completed more specific geo-spatial analysis known as the Shoreline Management Model (SMM). SMM uses the rules developed from the Decision Trees along with site specific knowledge of shoreline conditions to generate preferred shoreline management approaches termed “Shoreline Best Management Practices (BMPs).” Where they exist, Wetlands Boards should be utilizing this information in their decision-making. For localities where the model has yet to be completed, the Decision Trees are always available.

Table 2. Progress Toward Completion of Locality Specific Guidance for Shoreline BMPs

Completed Localities	Localities Scheduled for 2014 Release
Alexandria	Gloucester
Charles City	James City
Fairfax	Newport News
Hampton	Norfolk
Mathews	Northumberland
Northampton	
Poquoson	
Prince William	
Suffolk	
Virginia Beach	
Westmoreland	
York	

Special Circumstances

The SMM is based on a robust and accurate set of data. The rules or protocols that govern both the model and the Decision Trees are based on years of study and research. The model has been tested on-site and through laboratory generated examples. Therefore, there are few circumstances or conditions that may limit the use or practicality of the recommended approach resulting from either the model or the Decision Trees. These special circumstances are not common.

With few exceptions, Local Wetlands Boards should defer to the recommended practice in their application reviews. The following is a list of circumstances that, if present, would qualify as a site limitation. Applicants should be required to present evidence that these special conditions exist.

Special Circumstances

- 1) Presence of primary structure(s) close to the bank edge (e.g house, septic system, driveway)
- 2) Presence of rare, threatened or endangered species that would be impacted (e.g Northeast Tiger Beetle)
- 3) Nearshore bathymetry exceeds depths suitable for marsh planting (e.g. >2m)
- 4) Nearshore has submerged aquatic vegetation (SAV) which would be impacted
- 5) The site is a designated Area of Concern (AOC) as delineated by the SMM (e.g. marinas, man-made canals)



Bank grading would not be possible at this site because the house is located too close to the bank edge.



The complex infrastructure associated with marinas places them in the category "Area of Concern" where they require special consideration.

The Bottom Line

If the application is for a project other than the recommended approach, verification and review of the justification and site limitations should be required. Localities are advised to establish a formal process for the review of special circumstances and incorporate their use in permit decision-making. Wetlands Boards should require robust project details to verify these limitations.

Applying What We Have Learned

Virginia Marsh's application has been reviewed. The Local Wetlands Board consulted the information on the CCRMP for the locality. The recommended actions are shown in Figure 2. As indicated by the light green and tan dashed lines inside the red box, the approach calls for the riparian buffer and marsh (if present) to be enhanced and/or maintained. The Decision Tree shown in Figure 3 comes to the same conclusion. Both tools recommend forest management on the upland side and possible marsh planting with fiber logs at the shoreline. Trimming vegetation to increase sunlight may encourage the growth of marsh vegetation similar to the adjacent sites. In this case the recommendation includes multiple actions (refer to Table 1). Overall, these actions will likely cost the property owner significantly less than the revetment construction and no permit will be necessary by the Board. The property owner may require permission through the local Chesapeake Bay Preservation Act program if tree removal is necessary to reduce shading. The request to construct the revetment should be denied.



Figure 2. Recommended Shoreline Best Management Practices along Virginia Marsh's property as reported in the CCRMP

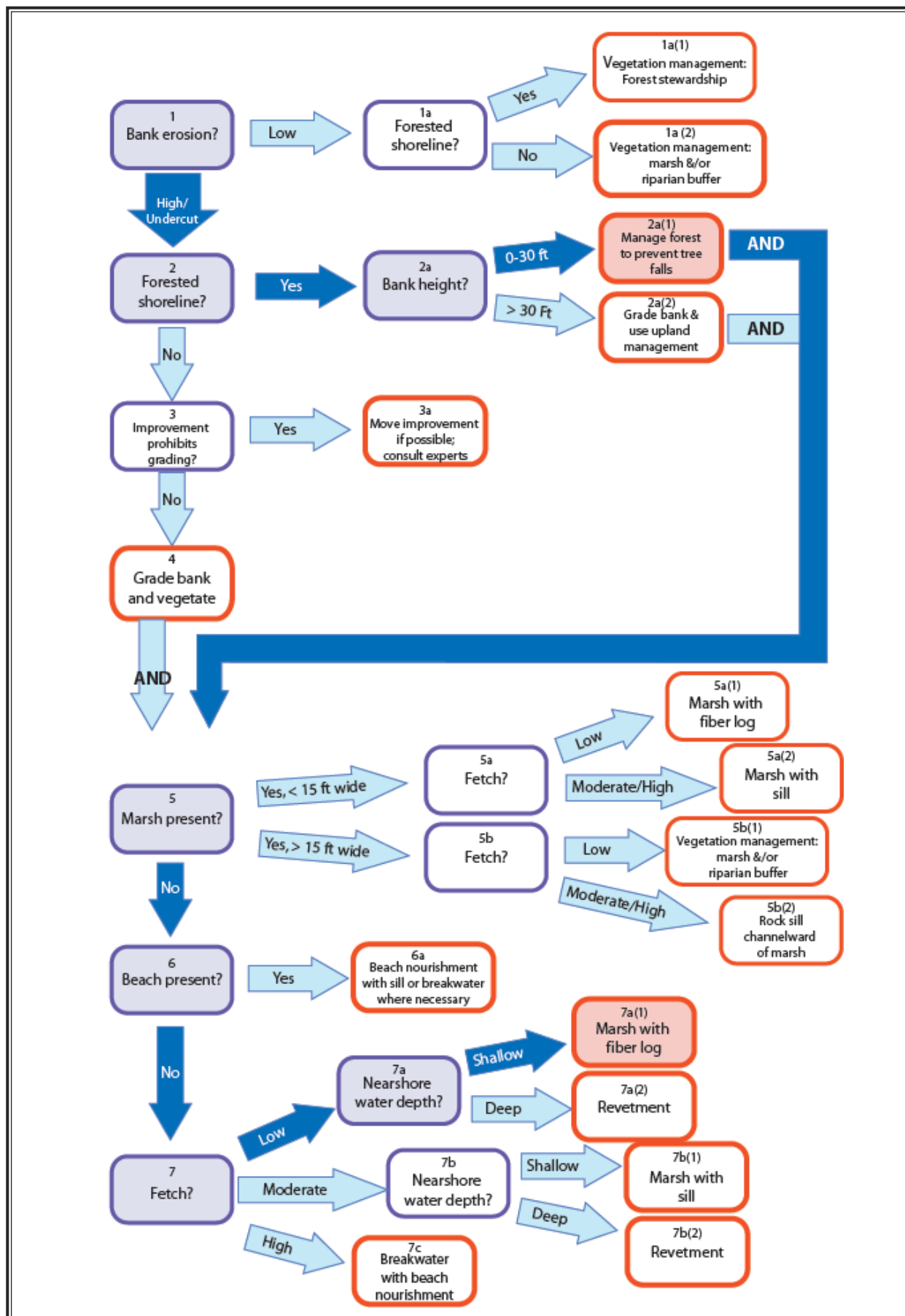


Figure 3. Decision Tree for Virginia Marsh's property

Legislative Perspective

Actions Mandated by the 2011 Living Shorelines Bill:

1. Implement a Living Shorelines General Permit regulation
2. Develop integrated guidance for the management of tidal shorelines
3. Develop comprehensive coastal resource management guidance for local governments to foster the sustainability of shoreline resources

The general permit and integrated guidance are to be undertaken by VMRC, the comprehensive guidance is the responsibility of VIMS.

Progress on the general permit had been hampered by questions about the authorization of the multi-jurisdictional permit process necessary to implement the 2011 legislation. Efforts to develop the permit were placed on hold while seeking a solution to the problem. New legislation this year (2014) clarifies the mandate to develop the general permit. The legislation specifically adds living shorelines to the list of activities listed in the law that are authorized if otherwise permitted by law.

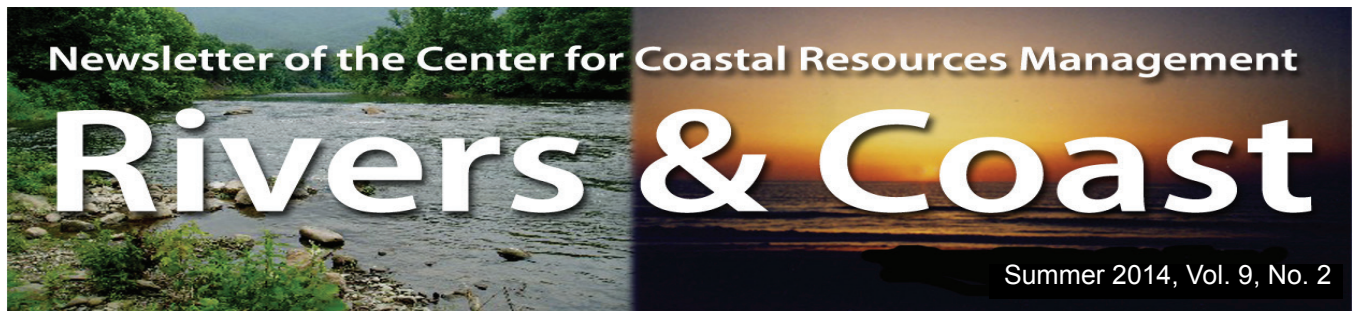
As of this time, efforts on the development of the integrated guidance have been limited to initial conversations only.

VIMS has proceeded on the development of the comprehensive guidance including the elements described in this report along with educational training and technical advisory activities.

Virginia Constitution, Article XI

“Further, it shall be the Commonwealth’s policy to protect its atmosphere, lands, and waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people of the Commonwealth.”





Living Shoreline Implementation: Challenges and Solutions

It's been over a decade since the term "living shorelines" burst on the scene; intended to garner attention and easily translate the idea that natural shoreline features which can provide erosion protection are also alive with terrestrial and aquatic plants, animals and biochemical processes. All this in contrast to the traditional shoreline erosion control approaches that provide little to no habitat, displace natural features and interrupt shoreline processes.

There has been an uptick in the number of requests and requirements for living shorelines as shoreline management efforts. However, the number of projects still falls quite a bit short of the anticipated percentages based on various assessment methodologies such as the Center for Coastal Resources Management (CCRM) Shoreline Management Model and decision trees that predict where living shorelines are appropriate. So, why is there a gap between the actual number of projects proposed and constructed and the number that should be constructed?

This question was posed at the recent Tidal Wetlands Workshop held at the Virginia Institute of Marine Science (VIMS) on May 22. The workshop was attended by about 140 representatives of wetlands boards, local government staffs, state agencies, environmental groups, contractors, and citizens. They tackled the subject of living shoreline challenges and solutions. The same subject was addressed in a questionnaire mailed to shoreline permittees last year. The questionnaire was part of a study directed by the Middle Peninsula Planning District Commission and funded by the Virginia Coastal Zone Management Program to assess the efficacy of low interest loans for living shoreline projects. Comments gathered at the workshop and responses to the questionnaire have identified three general challenges to widespread utilization of living shorelines. (The VIMS questionnaire is appendix C in this report [http://deq.state.va.us/Portals/0/DEQ/CoastalZone Management/FundsInitiativesProjects/task54-12.pdf](http://deq.state.va.us/Portals/0/DEQ/CoastalZone%20Management/FundsInitiativesProjects/task54-12.pdf))

- Information
 - What is a living shoreline?
 - Where do living shorelines work?
 - Where can I go to visit a living shoreline?
- Cost Concerns
- Permit Process

Possible solutions to the challenges have been a focus for VIMS' scientists, coastal managers, decision-makers and practitioners. Solutions were part of the workshop discussion as well as a topic of regional conferences, previous projects and meetings.

Living Shoreline Challenges

- Information
- Cost/ Financial Concerns
- Permit Process

Rivers & Coast is a biannual publication of the Center for Coastal Resources Management, Virginia Institute of Marine Science, College of William and Mary. If you would like to be added to or removed from the mailing list, please send correspondence to:

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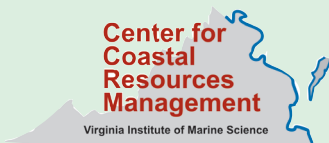
CCRM Director: Dr. Carl Hershner

Contributing Author: Pam Mason

Layout: Ruth Hershner

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A living shoreline was a perfect solution for our property, since we had specific aesthetic goals to meet, while working through the many challenges of our site. Our goal was to protect our property, while maintaining its natural quality.

Our heavily wooded shoreline is fronted by the Potomac River, with a 3 mile fetch, on one side, and an established 30 acre freshwater marsh on the other.

We worked closely with VIMS, the Corps of Engineers, and other state agencies as well as an environmental engineer to determine the proper approach to achieve our goals, and aid us through the permitting process.

We live with the benefits of our living shoreline every day. It gives us aesthetically pleasing erosion protection while providing a natural habitat for the wildlife. It only grows better with every season.

Mary Rust

Citizen and Wetlands Board Member, Stafford County.

Information

Property owners, practitioners, and managers have all identified information limitations as a challenge. As a result, the confidence that this is a reasonable approach to control erosion is low.

While, there is a lot of information on living shorelines available at the CCRM website, there is information on other sites as well - like NOAA, the Chesapeake Bay Foundation, the Partnership for the Delaware Estuary, Maryland Department of Natural Resources and others. There are also various brochures and print materials. (See links page)

A fundamental question of decision makers and property owners is, where do living shorelines work? The CCRM website provides two decision support tools to help with that question. First, decision trees: one for properties with no previous erosion control structure(s), and a second one for properties with existing structure(s). Simple observations made on site will answer questions in the tree leading to a recommendation. Second, is an analytical GIS model called the Shoreline Management Model. The model follows the decision tree logic process and provides the preferred shoreline best management practice(s) via a map viewer. These tools are both found under the Comprehensive Coastal Resources Management Portal (CCRMP) on the CCRM website. <http://ccrm.vims.edu/ccrmp/index.html>

The CCRM website also houses an area dedicated to living shoreline information. This site is found under the living shorelines heading. <http://ccrm.vims.edu/livingshorelines/index.html>

At the website you can find information on:

- Definitions
- Design
- Project Drawings
- Photographic Examples
- Research
- Policy and Permitting

According to the CCRM questionnaire, the majority of people interested in shoreline protection seek advice from family, friends and contractors about best approaches. Since there are many more existing conventional structures (revetments and bulkheads) along Virginia's shorelines the advice generally comes from owners of these conventional structures. This effect is compounded when contractors are also unfamiliar with living shoreline construction and recommend conventional hardened structures.

The fact that there are few living shorelines projects along the shore creates another challenge: questions about the erosion control effectiveness. Fewer projects and newer projects means less opportunity to observe and assess the erosion control capabilities of the living shoreline approach in the near term and over time.

Where Can I Visit a Living Shoreline?

There are a growing number of publicly accessible living shoreline projects that serve as demonstration projects. These living shorelines may be visited to see firsthand how they look and how they work. These projects are intended to serve as living shoreline ambassadors and communicate the ecology

of living shorelines through observation, signage, brochures and on-site classes. Information about the project details can be found on the CCRM website and often by signage at each location. These projects have been built by and through partnerships with local governments, nonprofit organizations, and academic institutions with funding assistance from localities, state agencies, and groups like the Chesapeake Bay Trust, National Fish and Wildlife Foundation, and The Nature Conservancy.

Even with the increase in demonstration sites, there are many locales in Virginia that are far from one of these sites. A possible solution is the creation of a demonstration site implementation program. This would entail partnerships among many of those already involved in living shoreline planning, construction and funding. It also may be an option to leverage use of in lieu fees collected by localities for wetlands permits and Virginia Marine Resources Commission funds.

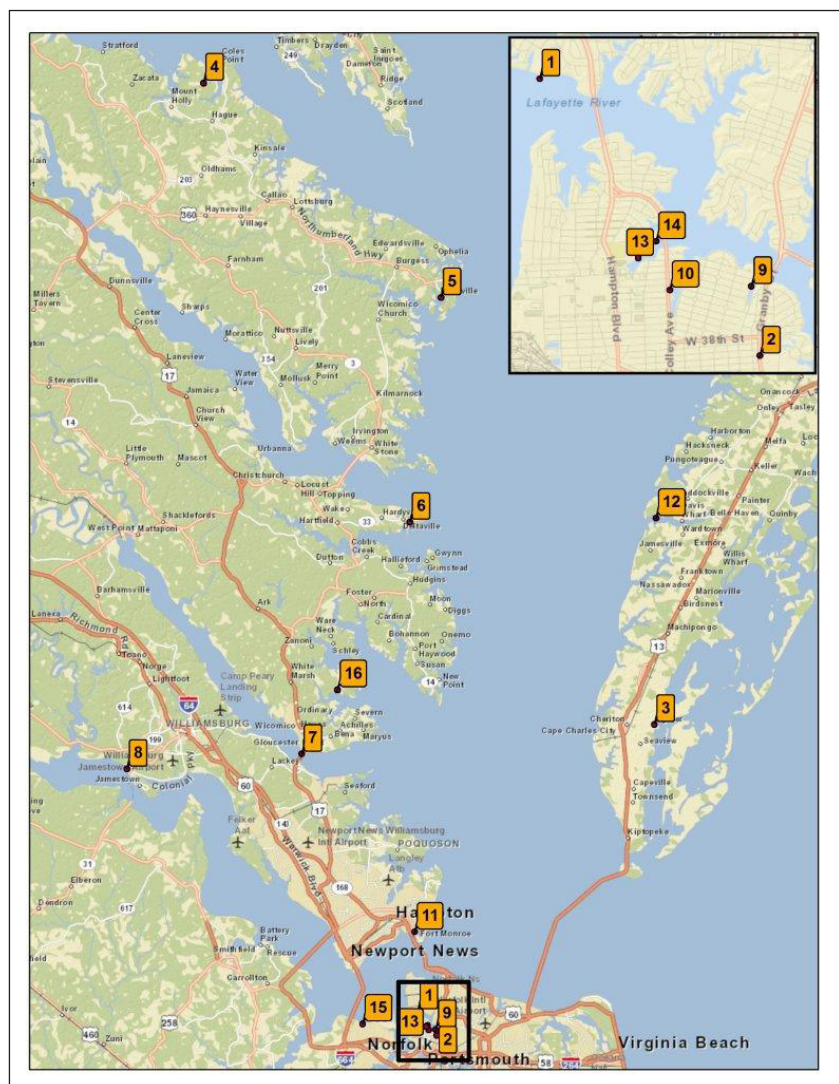


Figure 1. Map of Living Shoreline Demonstration Sites in Virginia (circa 2014) http://ccrm.vims.edu/livingshorelines/demonstration_area_map.html

Table 1. Living Shoreline Demonstration Sites in Virginia circa 2014

	Project and Location	Project Elements
1	Hermitage Museum and Gardens 7637 North Shore Road, Norfolk, VA	Marsh sill, planted marsh, oyster reefs, restored riparian buffer
2	Virginia Zoological Park 3500 Granby Street, Norfolk, VA	Retrofit rubble shoreline with marsh sill, planted marsh, restored riparian buffer, oyster reefs
3	Oyster Harbor Sunnyside Road, Oyster, VA	Bulkhead removal, planted marsh, marsh sill, oyster shell
4	Hull Springs Farm 645 Hull Springs Farm Road, Montross, VA	Marsh sill, planted marsh
5	Reedville Living Shorelines Teaching Garden 504 Main St, Reedville, VA	Restored tidal marsh and riparian buffer, marsh sill
6	Holly Point Nature Park Jackson Creek Road, Deltaville, VA	Planted marsh, fiber logs
7	VIMS Teaching Marsh Franklin Road, Gloucester Point, VA	Planted marsh, marsh sill
8	Jamestown 4H Educational Center 3751 4-H Club Road, Williamsburg, VA	Offshore breakwaters and beach nourishment
9	Haven Creek Living Shoreline Project East end of Massachusetts and Delaware Avenues, Norfolk, VA	Bulkhead removal, planted marsh, marsh sill
10	46th Street Project 46th street and Colley Avenue, Norfolk, VA	Retrofit rubble shoreline with marsh sill, planted marsh
11	Phoebus Living Shoreline Mugler Bridge at E. Mellon St, Hampton, VA	Retrofit rubble shoreline with marsh sill, planted marsh
12	Camp Occohannock Living Shoreline End of State Rt 801, Bell Haven, VA	Planted marsh, marsh sill, oyster reef
13	Colley Bay Living Shoreline Project 1145 Bolling Avenue, Norfolk, VA	Retrofit rubble shoreline with marsh sill, planted marsh
14	Bolling Square Living Shoreline Project East terminus of Delaware Ave, near 955 Bolling Avenue, Norfolk, VA	Planted marsh
15	Hoffler Creek Wildlife Preserve 4510 Twin Pines Rd, Portsmouth, VA	Oyster shell bags, planted marsh
16	Johns Point Landing Terminus of Johns Point Rd, Gloucester, VA	Marsh sill, planted marsh

Cost

Another challenging concern for property owners seeking erosion protection is the cost of living shoreline projects.

A comparison of costs for 100 linear feet of on-shore revetment to the same length of created marsh and off-shore sill are based on site conditions. How much rock is needed for the on-shore revetment versus the sill? If sand is necessary to create the marsh, how much will it cost? If the marsh is already there, is the sill less expensive than the revetment?

Consideration of these direct costs often don't take into account maintenance of either the conventional or living shoreline option – or the costs of replacement due to storm failure or dilapidation. Living shorelines tend to be much more resilient to storms and resistant to becoming dilapidated, so these costs could be avoided. Finally, a cost that is routinely left out of the equation

is the cost to the ecosystem. Shoreline armoring typically results in reduced production of commercial and recreational fish and the loss of water quality improvement services. These are values maintained or enhanced by the vegetated and nonvegetated wetlands in living shoreline projects.

Another important consideration in the over-all project cost is the potential for compensatory mitigation requirements. Conventional shoreline armoring approaches often result in wetland and riparian vegetation loss. Wetland losses can lead to a requirement for mitigation, an increase in project cost. As living shorelines are considered self-mitigating, any vegetation loss is made up for in the wetland creation on site. There is a general sense among managers and practitioners that the costs of living shorelines are comparable to conventional structures.

Thinking creatively about solutions to funding living shoreline projects will also aid in getting more projects on the ground. Many ideas on funding have been identified such as low interest loans, cost share, tax relief, and others. There are some organizations that offer funding opportunities to offset project costs. The National Oceanic and Atmospheric Administration (NOAA) Restoration Center, the Chesapeake Bay Trust, National Fish and Wildlife Foundation, the Nature Conservancy and others have provided support for living shoreline projects. However, competition for project funds runs high and the on-going annual grant opportunities are limited.

One solution would be for Virginia to support a cost-share program comparable to those offered in other jurisdictions. There is also interest in access to low interest loans as a financial incentive.



This living shoreline in Mathews is over 10 years old and survived Hurricane Isabel in 2003.

Table 2. Cost Estimates for Shoreline Management Approaches (*average cost per linear foot*)

Nonstructural (planting grading/fill)	Hybrid (marsh + sill)	Breakwaters (offshore)	Structural (revetment)	Location	Date
\$100-200	\$250-400	\$450-600	\$500-1,200	Maryland	circa 2014
\$100-225	\$250-700	\$450-1,000	\$500-1,500	Delaware Estuary	circa 2012
\$45+	\$120-395	\$125-200	\$115-285 (low energy)	Northern Gulf of Mexico	circa 2008
\$50 - \$100	\$150-\$300	\$350-\$500	\$500-\$1000	Maryland	2007
\$45+	\$100+	\$150-\$250	\$115-\$1200	Florida	2008

References for Table 2

http://www.seagrantsunysb.edu/Images/Uploads/PDFs/LivingShorelines0513-Presentations/5_NYSG_Living_Shorelines_Maryland.pdf

http://www.delawareestuary.org/pdf/Living%20Shorelines/LivingShorelinesBrochure_feb2012.pdf

http://msucares.com/crec/envi/publications/living_shorelines_cost_estimates.pdf

<http://www.cbf.org/Document.Doc?id=60>

<http://www.gulfalliancetraining.org/dbfiles/Cost%20and%20Maintenance%20of%20Living%20Shorelines.pdf>

Permit Process

Complex and/or conflicting permit processes are another challenge to living shoreline implementation. Shoreline erosion structures require permits, with the number of permits varying by locality. The sequence and timing of the review processes can be confusing as multiple local, state and federal agencies can be involved.

The number of permits and sequencing issues can arise whether the proposed action is a living shoreline or a conventional revetment. So permitting conventional structures is often equally complex.

Stream lining and coordination of permit processing is underway to provide a solution to the complex permit process. Virginia is working to make the permit process easier through the establishment of a general permit. The permit is planned to be faster and less expensive than a permit for a conventional structure. Along with the general permit, Virginia is tasked with development of integrated shoreline guidance. The Living Shorelines Act (SB 964) requires the guidance to improve communication and processing efficiencies among the regulatory authorities.

One complicating issue in permitting living shorelines is how to deal with the creation of a planted marsh or dune. Planting vegetation works best at certain times of the year and permit conditions for planting times can affect construction timelines. Also, creation of marsh may also impact wetland and shallow water ecosystems resulting in monitoring requirements to determine and ensure success. The task for the regulatory community is to find ways to integrate the guidance and coordinate permit review. One step in this direction is the development of the Virginia general permit for living shorelines. We should look for opportunities to accept existing permit requirements and conditions by all permitting authorities.

Integrated guidance and the general permit are both incremental cost savings solutions. However, real funding solutions would provide a great incentive for the use of living shorelines.

For any given living shoreline project, many regulatory authorities will require permits. Unfortunately conflicts can arise between the requirements from the different agencies. Additionally, review times vary, which presents conflict. For instance, a U.S. Army Corps of Engineers' Nationwide Permit for living shorelines may be attained in a relatively short timeframe, however, local wetland board approvals come later due to public advertisement and meeting schedules. The designer also needs to consider the implications of the Chesapeake Bay Preservation Act if any clearing of the buffer area of the Resource Protection Area must occur and what permit requirements are associated with those activities.

Jim Cahoon, PWD

Vice President, Bay Environmental, Inc.

Colley Bay Phase I - Before



Colley Bay Phase I - After



(photos by Kevin R. Du Bois)

The City of Norfolk has been successful in implementing living shoreline projects through a concerted effort of demonstration projects, Wetlands Board education, financial support and partnerships with citizens and NGOs.

Key components to our success are the highly visible and public living shoreline demonstration sites in the City. We took advantage of resources at VIMS to learn about living shoreline design and worked with VIMS and NOAA Restoration Center on other public demonstrations. The demonstration projects built regulatory confidence within the Wetlands Board. In 2013, the Board approved a living shoreline solution for 71% of all erosion control projects where one was technically feasible –including projects that were initially submitted with a shoreline hardening solution.

But perhaps most importantly, staff have developed a network of partnerships with local public schools, university graduate and undergraduate volunteers, local NGOs, Master Gardeners, Master Naturalists, and other interested citizens to build a constituency to promote, design, fund, and build living shorelines independent of city initiatives.

Kevin R. Du Bois, PWS, PWD, CFM

Bureau of Environmental Services, City of Norfolk

The Nature Conservancy, the Eastern Shore Resource, Conservation and Development Council (RC&D), and Occohannock on the Bay Camp and Retreat Center worked together to install a 1,030-ft marsh-sill living shoreline along the camp's property in Accomack County, Virginia. The goal of this project was to demonstrate to homeowners that living shorelines are a viable nature-based approach to mitigating shoreline erosion in the face of accelerating sea-level rise and storm surge events.

continued on page 8

The project faced some challenges in terms of design and permitting due to (1) the large fetch and acute erosion, and (2) a dense SAV bed in the nearshore. Working with the regulatory agencies, we were able to find a design that worked within the biological and physical shoreline conditions of the site. While working through the permit modifications delayed the project by several months, in the end it was absolutely worth ensuring the project more effectively met ecological goals for shoreline restoration and coastal resilience while also protecting the camp's critical infrastructure.

Gwynn Crichton
Senior Project Scientist, The Nature Conservancy

Solutions are available for some of the living shoreline challenges and other solutions remain to be developed and implemented. The CCRM living shorelines website is full of information and decision-making tools. Other solutions, such as improved, simplified permitting are in progress with the general permit, but Virginia needs to produce the comprehensive integrated shoreline guidance. The number of demonstration sites is increasing, but more options should be available throughout Tidewater to visit. Finally, a greater commitment to continued funding to assist in implementation of living shorelines would help increase the use of this approach along Virginia's shorelines

Living Shorelines Information

Websites

NOAA Habitat Conservation

<http://www.habitat.noaa.gov/restoration/techniques/livingshorelines.html>

Delaware Estuary

<http://www.delawareestuary.org/living-shorelines>

Maryland Department of Natural Resources

<http://www.dnr.state.md.us/ccs/livingshorelines.asp>

Southern Environmental Law Center

<http://www.southernenvironment.org/cases-and-projects/living-shorelines>

North Carolina Coastal Federation

<http://www.nccoast.org/Content.aspx?Key=76664726-1d0d-4f30-a6b0-c2702bf97ee3&title=Living+Shorelines>

Northern Neck Master Gardeners

<http://www.nnmg.org/shoreprotect.asp>

Brochures, Articles, etc.

Virginia DEQ Living Shorelines Fact Sheet

<http://www.deq.virginia.gov/Portals/0/DEQ/CoastalZoneManagement/lufactsheet.pdf>

Chesapeake Bay Foundation Brochure

<http://www.cbf.org/Document.Doc?id=60>

Galveston Bay Foundation Brochure

http://galvnbay.org/docs/LS_brochure.pdf

Youtube Videos

Living Shorelines (Part 1): Mississippi-Alabama SeaGrant

<https://www.youtube.com/watch?v=ZM7BSQewoGc>

VIMS Living Shorelines

https://www.youtube.com/watch?v=R1Z_DtLdR0w

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Adaptive Planning for Flooding and Coastal Change in Virginia: Legal and Policy Issues for Local Government Conference

The Virginia Coastal Policy Clinic (VCPC) and the Virginia Institute of Marine Science (VIMS) hosted a forum for local governments and coastal stakeholders to discuss legal and policy issues related to coastal flooding.

The conference was presented by VCPC and VIMS, in collaboration with the Commonwealth of Virginia. Speakers included:

- Secretary of Natural Resources Doug Domenech
- Norfolk Mayor Paul D. Fraim
- Virginia Beach Mayor Will Sessoms
- Hampton Mayor Molly Ward and
- Virginia Delegate Christopher O. Stolle (83rd District)

[Presentation Materials and Video](#) [Post-Conference Report](#)

Use of Guidance to Preserve and Protect Wetlands



Use of Guidance to Preserve and Protect Wetlands

The Virginia Tidal Wetlands Program turned 40 in 2012 as the original Tidal Wetlands Act legislation was passed in 1972. Since that time, Tidewater Virginia has changed significantly. Population has grown by over 100% for each decade since 1970, growing from 4.5 million to over 8 million. Tidewater, which occupies just a little less than 30% of Virginia's landmass, has consistently been subject to the greatest growth and is home for over 60% of Virginia's population (United States Census Bureau, Decennial Census Data 2010). As a result, the status of Virginia's tidal shoreline resources has changed too.

Historically considered a barrier to humans, wetlands were lost to filling and dredging to create reach of the landmass upon which sits many Virginia coastal cities, towns, roads and commercial shipping facilities. Communities with networks of boat canals were generally created from dredged tidal creeks and wetlands. It has been estimated that as much as half of the pre-colonial tidal wetlands in Virginia were lost through these processes. The Tidal Wetlands Act passage in 1972 certainly changed the way we look at tidal wetland resources.

The Tidal Wetlands Act codified the scientific thinking reflected in research conducted mostly at Virginia Institute of Marine Science (VIMS) and elsewhere in the 1960s and 70s. Natural heritage and ecologists were starting to investigate the role of tidal wetlands in the ecology of coastal systems. This body of work established the evidence for ecosystem services of wetlands including high rates of primary production (oxygenative



It was common practice before passage of the Tidal Wetlands Act that *dead basins* were created from a small tidal creek. There has also been a lot of development, which is indicative of development throughout Tidewater Virginia. (Image on right courtesy of Google Earth)

The Virginia Tidal Wetlands Program turned 40 in 2012. Since that time the development pressures in Tidewater Virginia have increased significantly, our scientific understanding of tidal wetlands and shorelines has notably advanced and we are experiencing continued wetland loss from development and sea level rise.

The latest issue of [Rivers and Coast](#) details the evolution in VIMS guidance to account for these changes as Virginia maintains the commitment stated in the Tidal Wetlands

Act to preserve and prevent despoliation and destruction of wetlands.

Mid-Atlantic Living Shorelines Summit

December 10-11, 2013 Cambridge, Maryland

Registration is Now Open!

[Click here to register](#)

The Maryland Department of Natural Resources, Chesapeake Bay Trust, and Restore America's Estuaries invite you to participate in and explore in-depth the state of the science, policy, and practice of Living Shorelines in the Mid-Atlantic region.

The Summit will be a two day working meeting focused on the latest



advancements in living shorelines research, implementation and policy, as well as promoting dialogue and addressing barriers to realization. There will be an energizing mix of presentations and facilitated breakout sessions designed to broaden participants' ability to implement projects and programs more effectively.

Contact [Karen Duhring](#) for more information.

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Save-The-Date: May 22, 2014 - Tidal Wetlands Workshop

This workshop at VIMS will focus on the current status of living shorelines in Virginia. Registration is \$25 and includes lunch.



Planned Workshop Topics:

- Living shoreline case studies
- Research summary & update
- New demonstration projects
- Group breakout discussions
- General Assembly update

[More Information](#)
[Register Now](#)



The next edition of the [Virginia Wetlands Report](#) is now available with supporting information for the upcoming workshop and other tidal wetland news and events.

New Living Shoreline Journal Article in Ecological Engineering

A new paper by CCRM scientists Dr. Donna Bilkovic and Molly Mitchell was recently published in the journal Ecological Engineering. This paper

evaluates the relative habitat capacity of marsh-sills by comparing plant, sediment, and benthic macroinvertebrate attributes in intertidal and subtidal zones of existing marsh-sills, natural marshes, tidal flats, and riprap revetment within two subestuaries of Chesapeake Bay. The [abstract and full manuscript](#) are available at the CCRM Living Shorelines web site.



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[Rivers & Coast](#)

[Virginia Wetlands Report](#)

Workshop Reminder: May 22, 2014 - Tidal Wetlands Workshop

The next VIMS workshop will focus on the Current Status of Living Shorelines in Virginia. The planned agenda includes presentations on current practices, research and policy; two panel discussions with marine contractors and local-state-federal regulatory officials; and a breakout session so everyone gets a chance to voice concerns, opinions, and suggestions for how to move forward.



Registration is \$25
and includes lunch

8:00 am - 9:00 am - Check-In
9:00 am - 3:30 pm - Workshop

REGISTRATION DEADLINE
Friday, May 16 at 5:00 pm

[Register Now](#)

Rivers & Coast New Guidance for Local Wetlands Boards

The latest issue of [Rivers & Coast](#) recommends procedures for Local Wetlands Boards in their review of tidal shoreline permit applications. Conforming to these procedures ensures Board actions are consistent with the new policy established by recent Code amendments that identify living shorelines as the Commonwealth's preference for tidal shoreline erosion control.



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Celebrating American Wetlands Month

EPA's Watershed Academy is pleased to sponsor its 84th free Webcast Seminar on Wednesday, May 14, 2014.

"Living Shorelines - Types, Tools, and Techniques"

Join us for a webcast on living shorelines - erosion control practices that protect the natural structure and function of shorelines through strategic placement of materials including native plants, sand, and stone. Unlike traditional erosion control structures (such as bulkheads and seawalls), living shorelines can stabilize shorelines while maintaining natural processes and land-water connections that are important for wildlife and clean water. This webcast will introduce living shoreline projects and explain the values of such projects and their implementation methodologies. Important points to be covered include: site selection criteria, appropriate techniques for differing energy regimes, innovative practices, and implementation tools.

Speakers:

- Tracy Skrabal, Senior Coastal Scientist and Southeast Regional Manager, North Carolina Coastal Federation
- Pam Mason, Senior Coastal Management Scientist, Center for Coastal Resources Management, Virginia Institute of Marine Science (VIMS)
- Dr. Danielle Kreeger, Science Director, Partnership for the Delaware Estuary (PDE)

This webcast is being held in celebration of American Wetlands Month. For more information you can see the [May is American Wetlands Month](#) site. Living shorelines help maintain wetlands by incorporating them into their design when appropriate and by allowing an opportunity for wetlands to migrate in response to sea level rise.

Webcast website: www.epa.gov/watershedwebcasts

Informational flyer: [May 14 Webinar.pdf](#)

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[Marine Debris
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Rivers & Coast: New Issue Now Available

The next issue of the Rivers & Coast newsletter focuses on [Living Shoreline Implementation: Challenges and Solutions](#).

Read about recent workshop discussions and other sources that investigate why living shoreline projects are still not as popular as bulkhead and revetments for shoreline stabilization. Many agree that more demonstration projects are effective tools to expand interest and implementation. That is why this issue features [new living shoreline demo sites](#).



CCRMP Update: New Local Government Web Portals Coming Soon

Comprehensive Coastal Resource Management Portals (CCRMPs) are now available for 12 localities in coastal Virginia. The Center's GIS & wetland staff have been busy for the 4th consecutive year updating shoreline and tidal marsh inventories in 5 more localities. New CCRMP web portals will be available in early 2015 for these locations:

- James City County
- City of Newport News
- City of Norfolk
- Gloucester County
- Northumberland County

No matter where you live or work, bookmark the [CCRMP web site](#) to learn how you can apply these GIS tools for shoreline and coastal resource management. CCRMP Orientation Training is available on request. A special session for new localities will be held in February 2015. Contact the [CCRM training coordinator](#) if you would like to participate or need more information.

Marine Debris Program: Research Update

CCRM and William & Mary scientists conducted research this summer to investigate how Eastern diamondback terrapins interact with crab pots and how to reduce by-catch mortality. These reptiles are a species of concern in Virginia and they are often trapped and killed in crab pots. Their social and playful tendencies observed during the study might explain why many become by-catch victims. The Bay Journal recently published an [article about this study](#) which was funded by a grant from the National Fish and Wildlife Foundation. More information about [CCRM's marine debris removal program](#) and [terrapin research](#) is available on our web site.



What I Did This Summer: Emily Egginton Skeeihan



photo courtesy VA Sea Grant

CCRM graduate student and Sea Grant Research Fellow Emily Egginton Skeeihan spent this summer studying the Lynnhaven River Basin Ecosystem Restoration Plan and how to incorporate climate change forecasts into restoration related policy. Emily's research was recently featured in a

[Virginia Sea Grant news story.](#)

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Product 3: Permit Database Website

The Center for Coastal Resources Management posts all tidal wetland Joint Permit Applications with associated photos, public hearing notices, additional information, and VIMS Reports in a searchable database on our website (<http://ccrm.vims.edu/perms/newpermits.html>). This grant year there were 382 hits on the online permit database by both regulators and the regulated community. The following is a list of all the applications that were received and posted to our website during this grant year.

PERMIT	APPLICANT	LOCALITY	DATE
13-1487	Paul J. Loustaunau	Middlesex County	2013-10-03
13-1489	Coach's Corner LLC	Westmoreland County	2013-10-03
13-1491	Nature Conservancy, The	Northampton County	2013-10-03
13-1493	Bay Breeze Enterprises, Inc.	City of Virginia Beach	2013-10-03
13-1496	Elma Dirolf, et al	Westmoreland County	2013-10-03
13-1501	Darryl Krolicki	Northumberland County	2013-10-03
13-1507	Conrad C. Hylton	Gloucester County	2013-10-03
13-1514	George L. Johnson	Mathews County	2013-10-03
13-1515	James M. Shinault, III	Mathews County	2013-10-03
13-1523	Coles Point Enterprises, LLC	Westmoreland County	2013-10-10
13-1532	Bert Sinanis	City of Virginia Beach	2013-10-10
13-1551	Pamela C. Russell	Northumberland County	2013-10-18
13-1552	Robert Lang	Accomack County	2013-10-18
13-1553	Gale Alls	Lancaster County	2013-10-18
13-1554	Scott Edmonds	Mathews County	2013-10-18
13-1557	Dennis C. Stanley	Lancaster County	2013-10-18
13-1560	Christy Wilson	City of Hampton	2013-10-18
13-1563	Army Corps of Engineers	Accomack County	2013-10-18
13-1567	Sun Communities Operating Ltd. Partnership	Mathews County	2013-10-18
13-1568	Metro Fiber Networks, Inc.	multiple	2013-10-18
13-1572	Jeffery Smith	Mathews County	2013-10-18
13-1573	William Corbin	Mathews County	2013-10-18
13-1575	Coalition for the Preservation of Fisher	City of Newport News	2013-10-18
13-1576	Chincoteague Sunsets LLC	Accomack County	2013-10-18
13-1577	Paul Howle	Middlesex County	2013-10-18
13-1578	Erik Jones	City of Virginia Beach	2013-10-18
13-1581	Michael Degen	Stafford County	2013-10-18
13-1588	Harry B. Van de Graaff	Accomack County	2013-10-18
13-1593	Edwin A. Sisson	Northumberland County	2013-10-21
13-1594	Hess Corporation	City of Chesapeake	2013-10-21
13-1596	Virginia Beach Public Works, City of	City of Virginia Beach	2013-10-21
13-1499	David Bowditch	Gloucester County	2013-10-21
13-1538	Boyd Collier	Mathews County	2013-10-21

13-1541	Gwynn's Island RV Resort	Mathews County	2013-10-21
13-1544	Newport News Department of Engineering	City of Newport News	2013-10-21
13-1548	Virginia Beach Department of Public Work	City of Virginia Beach	2013-10-21
13-1543	R F. McLain	Northumberland County	2013-10-22
13-1605	Metro Machine	City of Norfolk	2013-10-22
13-1611	Army Corps of Engineers	multiple	2013-10-24
13-1612	Pamela C. Russell	Northumberland County	2013-10-24
13-1613	Ralph P. Pecorelli	Accomack County	2013-10-24
13-1614	Lighthouse	City of Chesapeake	2013-10-24
13-1616	Fishing Bay Harbor Marina	Middlesex County	2013-10-24
13-1617	Jeffrey R. Davies	Northumberland County	2013-10-24
13-1622	Dennis Hobbs	City of Virginia Beach	2013-10-30
13-1623	Kenneth Berkle	City of Virginia Beach	2013-10-30
13-1625	Kenneth Campbell	City of Chesapeake	2013-10-30
13-1626	Virginia Port Authority	City of Newport News	2013-10-30
13-1627	Virginia Port Authority	City of Norfolk	2013-10-30
13-1629	Virginia Port Authority	City of Portsmouth	2013-10-30
13-1637	AFETA Camp Peary	York County	2013-10-30
13-1645	Willard Wilcox	Westmoreland County	2013-10-30
13-1647	South Hill Banks Civic Association, Inc.	Essex County	2013-10-30
13-1648	Charles E. Powell	Mathews County	2013-10-30
13-1649	Eugene Kearns	Northumberland County	2013-10-30
13-1566	Donald J. Gawen	Westmoreland County	2013-10-31
13-1654	Linda H. Gaskins-Jeffers	Gloucester County	2013-11-01
13-1655	Rainer Regul	Gloucester County	2013-11-01
13-1660	Tarkill Aquaculture Ventures, LLC	Accomack County	2013-11-01
13-1669	David Elebash	Accomack County	2013-11-07
13-1670	Virginia Institute of Marine Science	Gloucester County	2013-11-07
13-1675	Michael Leanzo	City of Virginia Beach	2013-11-07
13-1641	Edward G. Holmes	City of Virginia Beach	2014-01-14
13-1104	Larry Hammon	Accomack County	2014-01-30
13-1677	Stalwart Films LLC	Charles City County	2013-11-07
13-1679	Alan L. Ross	Northumberland County	2013-11-07
13-1680	John Watts	Gloucester County	2013-11-07
13-1681	Ernest P. Mawusi, et al	Gloucester County	2013-11-07
13-1685	Old Dominion University	City of Norfolk	2013-11-07
13-1688	Joan V. Craven	Accomack County	2013-11-07
13-1691	Colonna's Shipyard	City of Norfolk	2013-11-07
13-1694	Pete Alcorn	Middlesex County	2013-11-07
13-1696	David Shriver	Northumberland County	2013-11-07
13-1700	Dominion Virginia Power	Mathews County	2013-11-13
13-1701	Beverly A. Monk	York County	2013-11-13
13-1697	David Ramsey	City of Virginia Beach	2013-11-13

13-1707	Charles P. Kellar	Middlesex County	2013-11-20
13-1709	Waters Grand View Farms, LLC	Accomack County	2013-11-20
13-1710	Tom Woods	Essex County	2013-11-20
13-1711	Scott Edmonds	Mathews County	2013-11-20
13-1724	Karen Wright	Northampton County	2013-11-20
13-1731	Donna S. Herbert	City of Newport News	2013-11-20
13-1732	David E. Durrett	Richmond County	2013-11-20
13-1733	Butler Properties, LLC	City of Virginia Beach	2013-11-20
13-1734	Virginia Commonwealth University	Charles City County	2013-11-20
13-1735	Steven S. Heinrichs	King and Queen County	2013-11-20
13-1744	Thomas Dale Gaskins Seafood	Northumberland County	2013-11-20
13-1745	307 Campostella, LLC	City of Norfolk	2013-11-20
13-1727	Hampton, City of	City of Hampton	2013-11-20
13-1748	Carolyn S. Davis	Northumberland County	2013-11-20
13-1749	Steven Terapane, et al	City of Virginia Beach	2013-11-20
13-1752	Prince William County Service Authority	Prince William County	2013-11-20
13-1698	Beverly R. Phaup	Mathews County	2013-11-20
13-1755	Ivo H. Romenesko, et al	Lancaster County	2013-11-21
13-1761	Blue Bird Gap Farm	City of Hampton	2013-11-25
13-1762	Michael Kahan	City of Virginia Beach	2013-11-25
13-1772	Kinder Morgan Elizabeth River Terminals	City of Chesapeake	2013-11-26
13-1773	Kinder Morgan Money Point Terminal	City of Chesapeake	2013-11-26
13-1781	Helix Home Renewal Services, Inc.	City of Virginia Beach	2013-12-03
13-1786	Joseph J. Vitak	Accomack County	2013-12-03
13-1788	Lynne Eklund	City of Norfolk	2013-12-03
13-1789	Norfolk Department of Public Works	City of Norfolk	2013-12-03
13-1791	William A. Bell	Lancaster County	2013-12-03
13-1792	Ronald W. Boone	City of Norfolk	2013-12-03
13-1793	Ronald W, Boone	City of Norfolk	2013-12-03
13-1794	Ronald W. Boone	City of Norfolk	2013-12-03
13-1795	Ronald W. Boone	City of Norfolk	2013-12-03
13-1796	Dean Brassington	City of Norfolk	2013-12-04
13-1797	Circle Six Corporation	City of Norfolk	2013-12-03
13-1798	Myrtle Dorman1704 E. Ocean View Avenue	City of Norfolk	2013-12-03
13-1799	Thomas Drake	City of Norfolk	2013-12-03
13-1800	Catherine R. Ford	City of Norfolk	2013-12-03
13-1801	F. M. Gamage, Jr.	City of Norfolk	2013-12-03
13-1802	Margaret Thomas, et al	City of Norfolk	2013-12-03
13-1803	Catherine McCoy	City of Norfolk	2013-12-03
13-1804	Catherine McCoy	City of Norfolk	2013-12-03
13-1805	Pete Nuland	City of Norfolk	2013-12-03
13-1806	Virginia B. Oden	City of Norfolk	2013-12-03
13-1807	Sandra G. Singletary	City of Norfolk	2013-12-03

13-1808	Judith Swystun, et al	City of Norfolk	2013-12-03
13-1809	Nicholas Vandergrift	City of Norfolk	2013-12-03
13-1810	Nicholas Vandergrift	City of Norfolk	2013-12-03
13-1776	Kelly Jones	City of Norfolk	2014-01-02
13-1716	Heron Watch POA, Inc.	Accomack County	2014-01-14
13-1771	Dominion Virginia Power	City of Norfolk	2014-01-17
13-1704	Howard Hardin	Middlesex County	2014-02-24
13-1811	Sandra G. Wilson	City of Norfolk	2013-12-03
13-1812	Marianne Wortham	City of Norfolk	2013-12-03
13-1813	Victor G. Yurkovic	City of Norfolk	2013-12-03
13-1815	R. T. Bland, III	King and Queen County	2013-12-03
13-1816	Brian Ingram	Mathews County	2013-12-03
13-1817	W. L. Norman, Jr.	City of Virginia Beach	2013-12-03
13-1824	Captains Cove Golf and Yacht Club Inc.	Accomack County	2013-12-09
13-1828	York River Seafood Inc.	Gloucester County	2013-12-09
13-1829	Virginia Institute of Marine Science	Accomack County	2013-12-09
13-1830	Karen B. Foecking	Northumberland County	2013-12-09
13-1831	Gene Taylor	Accomack County	2013-12-09
13-1827	Game and Inland Fisheries, Department of	Richmond County	2013-12-09
13-1835	Michael J. Manyak	Northumberland County	2013-12-10
13-1840	Chris Malone	City of Virginia Beach	2013-12-10
13-1843	Savage Neck LLC, et al	Northampton County	2013-12-12
13-1845	Wachapreague, Town of	Accomack County	2013-12-12
13-1848	Gregory R. Natvig	Lancaster County	2013-12-12
13-1849	Robert N. Meiser	Northumberland County	2013-12-12
13-1850	Conservation and Recreation, Department	Stafford County	2013-12-12
13-1851	Lee W. Gause	City of Virginia Beach	2013-12-12
13-1852	Stanley D. Dameron	Stafford County	2013-12-12
13-1854	Thomas A. Groce, Jr.	City of Virginia Beach	2013-12-12
13-1856	John Harvey	Essex County	2013-12-16
13-1859	Loretta Willis	City of Suffolk	2013-12-16
13-1861	Charles Wanko, Jr.	Northampton County	2013-12-16
13-1863	Alexander B. McMurtrie, Jr.	City of Virginia Beach	2013-12-16
13-1868	Prince William Marine Inc.	Prince William County	2013-12-17
13-1870	Tabbs Creek Civic Association	Lancaster County	2013-12-17
13-1877	Ray Johnson	Westmoreland County	2013-12-17
13-1878	Gregory R. Chambers	Middlesex County	2013-12-17
13-1880	Curtis D. Holdaway	Northumberland County	2013-12-17
13-1881	Virginia Natural Gas	City of Virginia Beach	2013-12-17
13-1885	H. F. Johnson	Northumberland County	2013-12-19
13-1887	Joseph Gibbs	Northumberland County	2013-12-19
13-1891	Jeb J. Amiss	Northumberland County	2013-12-19
13-1892	Frederick Marl	Northumberland County	2013-12-19

13-1894	Glebe Harbor-Cabin Point Property Owners	Westmoreland County	2013-12-19
13-1895	Glebe Harbor-Cabin Point Property Owners	Westmoreland County	2013-12-19
13-1896	Hampton Roads Sanitation District	multiple	2013-12-19
13-1897	Beach Drive Association	Essex County	2013-12-19
13-1821	John M. Wack	Westmoreland County	2014-01-07
13-1898	D. Kyle Woolfolk	Lancaster County	2014-01-02
13-1899	Cottage Line Civic League	City of Norfolk	2014-01-02
13-1900	Ronald W. Boone	City of Norfolk	2014-01-02
13-1903	Port Royal, Town of	Caroline County	2014-01-02
13-1905	GE Mobile Water, Inc.	City of Norfolk	2014-01-02
13-1906	Richmond, City of	City of Richmond	2014-01-02
13-1912	Army, Department of	Fairfax County	2014-01-02
13-1916	Zbigniew Majchrzak	City of Poquoson	2014-01-02
13-1917	Ned Motter	City of Poquoson	2014-01-02
13-1919	Walter Harrow	Middlesex County	2014-01-02
14-0004	Virginia Institute of Marine Science	Gloucester County	2014-01-07
14-0007	John H. Duncan	City of Virginia Beach	2014-01-07
14-0008	Maria Petrik Life Estate	Westmoreland County	2014-01-07
14-0012	Jerolene Evans	Essex County	2014-01-07
14-0015	William C. Spann	Accomack County	2014-01-08
14-0017	Norfolk, City of	City of Portsmouth	2014-01-13
14-0018	Robert Newbert	Accomack County	2014-01-13
14-0019	Walter Collins	City of Chesapeake	2014-01-13
14-0022	Marine Resources Commission	Northampton County	2014-01-13
14-0033	E. T. Dennis, III	Northumberland County	2014-01-14
14-0035	John Sidway	Northampton County	2014-01-14
13-1889	Charles Huffman, V	City of Virginia Beach	2013-12-19
14-0003	John C. Gretes	Gloucester County	2014-01-27
14-0034	Norfolk Yacht and Country Club	City of Norfolk	2014-02-05
14-0043	Joseph T. Block, et al	Charles City County	2014-01-15
14-0044	John C. Diehl, III	Mathews County	2014-01-15
14-0046	Robert Hurt	Accomack County	2014-01-15
14-0047	Chick Cove Association	Middlesex County	2014-01-15
14-0048	Westover Plantation LLC	Charles City County	2014-01-17
14-0050	Jim Usry	City of Hampton	2014-01-16
14-0051	East Beach, LLC	City of Norfolk	2014-01-16
14-0052	Stingray Point Boat Works, LLC	Middlesex County	2014-01-16
14-0056	Svinder S. Toor	City of Norfolk	2014-01-17
14-0066	Greg Ray	Northumberland County	2014-01-23
14-0054	Sunset Bay, LLC	Accomack County	2014-01-23
14-0065	Suzie Taylor, et al	Accomack County	2014-01-23
14-0069	Deep Creek Landing Marina	City of Newport News	2014-01-23
14-0071	Donald McGonegal	Lancaster County	2014-01-23

14-0072	David Pere, et al	Lancaster County	2014-01-23
14-0077	Edmund Ruffin	City of Virginia Beach	2014-01-24
14-0081	George Brooks	City of Virginia Beach	2014-01-24
14-0082	Joseph P. Harvey	City of Virginia Beach	2014-01-24
14-0086	Donald S. Loftiss	Lancaster County	2014-01-24
14-0087	Sherwood Forest Shores Association	Northumberland County	2014-01-24
14-0088	Richard T. Sanford	Richmond County	2014-01-24
14-0096	APEX	City of Chesapeake	2014-01-28
14-0104	Jennifer Wright	York County	2014-01-28
14-0105	Skipper Davis	Fairfax County	2014-01-28
14-0111	Cherry Point Property Owner's, et al	Mathews County	2014-01-30
14-0121	Carl W. Mortenson	Gloucester County	2014-02-05
14-0123	Potomac Landing Property Owners Associates	King George County	2014-02-05
14-0124	William R. Sweeney, III	King George County	2014-02-05
14-0067	Mark E. Anderson, et al	Mathews County	2014-02-07
14-0125	Michael A. Fisher	Mathews County	2014-02-05
14-0129	Mitchell Preddy	Middlesex County	2014-02-05
14-0130	Newport News Department of Engineering	City of Newport News	2014-02-05
14-0131	Jane Foretich	Gloucester County	2014-02-05
14-0134	LTM Development LLC	City of Virginia Beach	2014-02-05
14-0147	Marine Resources Commission	Middlesex County	2014-02-05
14-0149	Daniel Schroppe	City of Virginia Beach	2014-02-05
14-0157	Suzanne Myers	City of Virginia Beach	2014-02-07
14-0158	Charles M. Gilliam	York County	2014-02-07
14-0161	Lillian C. Austin, et al	City of Norfolk	2014-02-07
14-0150	Willard Hudgins	Mathews County	2014-02-10
14-0171	Army Corps of Engineers	Charles City County	2014-02-13
14-0178	Hyun T. Chang	City of Newport News	2014-02-13
14-0179	Gary Cole	Northampton County	2014-02-13
14-0187	Beggars Bridge Gunning Club Inc.	City of Virginia Beach	2014-02-13
14-0192	Clayton Shepherd	Westmoreland County	2014-02-13
14-0197	Chesapeake Landing Home Owners Assn.	City of Hampton	2014-02-13
14-0199	Jay Atchison	City of Virginia Beach	2014-02-13
14-0169	Edward B. Wood	Mathews County	2014-02-14
14-0203	Eric Olson	City of Virginia Beach	2014-02-14
14-0208	Glenn C. Young	King William County	2014-02-20
14-0209	Christopher E. Bystryk	King William County	2014-02-20
14-0210	Hampton Roads Sanitation District	York County	2014-02-20
14-0211	Bluewater Pt. Homeowners Association	Lancaster County	2014-02-20
14-0213	Elizabeth River Project	City of Norfolk	2014-02-20
14-0185	Forrest Wiseman	Northumberland County	2014-02-24
14-0191	Richard Farr	Northumberland County	2014-02-24
14-0216	Michael Sledd	Lancaster County	2014-02-20

14-0218	Tall Pines Campground	Accomack County	2014-02-24
14-0223	Chris Sheppard	City of Norfolk	2014-02-24
14-0225	Collins Recap III	City of Norfolk	2014-02-24
14-0227	Game and Inland Fisheries, Department of	Gloucester County	2014-02-24
14-0132	Leonard R. Miller, et al	Gloucester County	2014-02-25
14-0184	James R. Dinkins	City of Virginia Beach	2014-02-27
14-0151	Donald F. Klimkiewicz	City of Virginia Beach	2014-08-20
14-0229	Tri-Port Terminals, Inc.	City of Chesapeake	2014-02-25
14-0230	Joe Rose	Northampton County	2014-02-25
14-0231	Mark Kohler	Prince William County	2014-02-25
14-0234	Steve Hammer	City of Virginia Beach	2014-02-25
14-0236	TE&G1987, LLC	City of Norfolk	2014-02-25
14-0243	Robert Gayle	Mathews County	2014-02-27
14-0245	Darshak J. Patel	City of Virginia Beach	2014-02-26
14-0246	William Pascaros	City of Virginia Beach	2014-02-26
14-0247	Michael McAdams	York County	2014-02-27
14-0252	Steve Merz	City of Virginia Beach	2014-02-27
14-0255	Sidney Armsworthy	Northumberland County	2014-02-27
14-0256	Brightwaters Property Owners Association	Lancaster County	2014-02-27
14-0259	Edgar A. Jacques	Westmoreland County	2014-02-27
14-0260	Jacquelyn Kennedy, et al	Westmoreland County	2014-03-04
14-0267	Virginia Beach Department of Public Work	City of Virginia Beach	2014-03-04
14-0271	Middlesex County	Middlesex County	2014-03-04
14-0272	Glen Butler	City of Virginia Beach	2014-03-04
14-0275	Tri-Port Terminals, Inc.	City of Chesapeake	2014-03-12
14-0281	RockTenn	City of Hopewell	2014-03-12
14-0286	Alice Warlick	Mathews County	2014-03-12
14-0287	Talleysville Land & Timber	New Kent County	2014-03-12
14-0293	James Hill	City of Chesapeake	2014-03-12
14-0296	Earlene Newhart	City of Virginia Beach	2014-03-12
14-0302	A & N Electric Cooperative	Accomack County	2014-03-12
14-0306	Andrew R. Curtis	Mathews County	2014-03-12
14-0309	Sun Communities Operating Ltd. Partnership	Mathews County	2014-03-12
14-0314	Alan A. Rogers	Richmond County	2014-03-12
14-0319	Tina L. Martin	Accomack County	2014-03-12
14-0321	Suffolk, City of	City of Suffolk	2014-03-12
14-0340	Lawrence Wagner	Northumberland County	2014-03-26
14-0341	Underhill Creek, LLC	Accomack County	2014-03-26
14-0342	William Rainey	City of Virginia Beach	2014-03-26
14-0345	David Kilgore	City of Virginia Beach	2014-03-26
14-0350	Anthony Holmes	Northumberland County	2014-03-26
14-0352	Betty Kennedy	City of Virginia Beach	2014-03-26
14-0353	Chad Bronstein	City of Virginia Beach	2014-03-26

14-0355	Coast Guard, U.S.	Accomack County	2014-03-26
14-0366	Virginia Port Authority	City of Portsmouth	2014-03-26
14-0367	Norfolk, City of	City of Norfolk	2014-03-26
14-0368	Newport News Department of Engineering	City of Newport News	2014-03-26
14-0370	Craig D. Adler	Lancaster County	2014-03-26
14-0374	Kena Lucy	City of Virginia Beach	2014-03-26
14-0376	Rick Tillar	City of Virginia Beach	2014-03-26
14-0377	Claudia Svirksy	Essex County	2014-03-26
14-0379	Thomas Taylor	Middlesex County	2014-03-26
14-0384	Glen Cunningham	Accomack County	2014-03-26
14-0386	Jeffrey L. Dershem	Accomack County	2014-03-26
14-0387	Scott A. Taylor	Northumberland County	2014-03-26
14-0389	Joseph Mantzouranis	Northumberland County	2014-03-26
14-0390	Julia P. Parker, et al	City of Virginia Beach	2014-03-26
14-0392	James City County Dept. General Services	James City County	2014-03-27
14-0393	Evans Seafood	Accomack County	2014-03-26
14-0395	Robert Foos	Gloucester County	2014-03-26
14-0399	Wallace H. Dean	Lancaster County	2014-03-27
14-0402	Henry Stanley, Jr.	City of Virginia Beach	2014-03-27
14-0404	Nandua Selects LLC	Accomack County	2014-03-27
14-0407	Ron Post	City of Poquoson	2014-03-27
14-0409	James E. Johnson, Jr.	City of Virginia Beach	2014-03-27
14-0313	Thomas E. Wolters	York County	2014-03-28
14-0361	Thomas F. May	City of Portsmouth	2014-03-26
14-0335	Walesa LC	Middlesex County	2014-04-02
14-0316	Larry D. Lee, Jr.	Westmoreland County	2014-04-10
14-0310	Talleysville Land & Timber	New Kent County	2014-05-28
14-0329	William Miller	City of Virginia Beach	2014-05-28
14-0415	Navy, Department of	City of Norfolk	2014-03-27
14-0419	Army Corps of Engineers	Essex County	2014-03-27
14-0421	Keith Morauske	Northumberland County	2014-03-27
14-0425	River Pointe POA, Inc.	City of Portsmouth	2014-03-27
14-0426	George C. Kanuck	Lancaster County	2014-03-27
14-0431	Tommy L. Burke	Richmond County	2014-03-28
14-0435	Luck Stone Corporation	City of Chesapeake	2014-04-02
14-0436	Henderson, Inc.	multiple	2014-04-02
14-0437	Virginia Natural Gas	City of Norfolk	2014-04-02
14-0439	Robert Py	City of Norfolk	2014-04-02
14-0441	John Butterworth	City of Virginia Beach	2014-04-02
14-0443	Mark A. Schaefer	Essex County	2014-04-02
14-0446	Tom Walker	Middlesex County	2014-04-02
14-0448	National Oceanic and Atmospheric Adminis	City of Norfolk	2014-04-02
14-0449	Wendell Poulsen	Gloucester County	2014-04-02

14-0455	Kathy G. Batzel	City of Virginia Beach	2014-04-02
14-0456	Ralph T. Bullock, Jr.	Middlesex County	2014-04-02
14-0459	Darrell Walden	Essex County	2014-04-07
14-0461	Richard F. Hall, III	Accomack County	2014-04-07
14-0462	Norfolk, City of	City of Norfolk	2014-04-07
14-0463	York River Yacht Haven	Gloucester County	2014-04-07
14-0466	W3 Marine	City of Norfolk	2014-04-07
14-0470	Hampton Roads Sanitation District	City of Norfolk	2014-04-07
14-0483	Corey Schultz	Surry County	2014-04-09
14-0484	Virginia Beach Dept. Public Works	City of Virginia Beach	2014-04-09
14-0486	Six M LLC	City of Norfolk	2014-04-09
14-0491	Laura R. Johnson	Lancaster County	2014-04-09
14-0497	Project Green Teens	City of Virginia Beach	2014-04-09
14-0504	Newport News, City of	New Kent County	2014-04-10
14-0507	Thomas B. Hoover	King and Queen County	2014-04-10
14-0509	Navy, Department of	City of Norfolk	2014-04-10
14-0510	Plains Marketing, L.P.	York County	2014-04-10
14-0511	Russ Armstrong	Lancaster County	2014-04-10
14-0512	Prince William County Parks & Recreation	Prince William County	2014-04-16
14-0513	David Kashy	York County	2014-04-16
14-0520	E. Derwin Booker	Lancaster County	2014-04-16
14-0526	Columbia Gas of Virginia	Isle of Wight County	2014-04-16
14-0527	Gerald Negley	Accomack County	2014-04-16
14-0530	Roane Point L.L.C.	Mathews County	2014-04-16
14-0531	Anthony Heerbrandt	Mathews County	2014-04-16
14-0538	Game and Inland Fisheries, Department of	Charles City County	2014-04-21
14-0541	Chrysler Museum of Art	City of Norfolk	2014-04-21
14-0551	Reedville Oysters LLC	Northumberland County	2014-04-22
14-0552	Federal Highway Administration	Accomack County	2014-04-22
14-0564	Robert Petersen	City of Virginia Beach	2014-04-22
14-0568	James H. Cutting	Accomack County	2014-04-22
14-0569	Dorger Family Limited Partnership	Lancaster County	2014-04-22
14-0571	Wayne Franklin	City of Newport News	2014-04-22
14-0574	Keith Goldsein	City of Virginia Beach	2014-04-22
14-0575	K. S. Debnath	City of Suffolk	2014-04-22
14-0576	Virginia B. Hall	Accomack County	2014-04-22
14-0578	Virginia Beach, City of	City of Virginia Beach	2014-04-23
14-0581	Howard Shafferman	Lancaster County	2014-04-23
14-0582	Thomas Lyons	City of Virginia Beach	2014-04-23
14-0591	Richard Cornwell	City of Portsmouth	2014-04-24
14-0593	Deanna Martin	City of Norfolk	2014-04-24
14-0594	J. D. Shenk	City of Newport News	2014-04-24
14-0595	Jessica Godfrey	City of Newport News	2014-04-24

14-0600	Michael Leanzo	City of Norfolk	2014-04-29
14-0602	Michael Dittfield	Northumberland County	2014-04-29
14-0612	James H. Wasiele	New Kent County	2014-04-29
14-0614	James River Association	Henrico County	2014-04-29
14-0617	Virginia Electric and Power Company	multiple	2014-04-30
14-0618	William C. Plemmons	City of Suffolk	2014-04-30
14-0621	Virginia Beach Department of Public Work	City of Virginia Beach	2014-04-30
14-0624	R. G. Smith	Lancaster County	2014-05-06
14-0625	Girl Scout Council of Colonial Coast	City of Chesapeake	2014-05-06
14-0629	Brian Smith	City of Suffolk	2014-05-06
14-0632	Army, Department of	Fairfax County	2014-05-06
14-0634	Miles Wong, et al	Gloucester County	2014-05-06
14-0640	Charles Love	Westmoreland County	2014-05-06
14-0645	Donna Weaver	Accomack County	2014-05-06
14-0654	Timothy Wise	York County	2014-05-13
14-0656	Bland Point Homeowners Association	Middlesex County	2014-05-13
14-0660	James J. Panzetta	Northumberland County	2014-05-13
14-0661	Surry County	Surry County	2014-05-13
14-0666	Sun Communities Operating Ltd. Partnership	Mathews County	2014-05-13
14-0667	Frank Gorse, et al	Gloucester County	2014-05-13
14-0671	Army Corps of Engineers	City of Virginia Beach	2014-05-13
14-0672	Robert Starkweather	Northumberland County	2014-05-13
14-0675	Vicki Toye	Northumberland County	2014-05-13
14-0677	SummitIG, LLC	multiple	2014-05-13
14-0678	George Magher	Accomack County	2014-05-13
14-0688	C. D. Whitley	City of Virginia Beach	2014-05-16
14-0694	Cox Communications	City of Hampton	2014-05-16
14-0695	Barbara L. Vandeventer	City of Virginia Beach	2014-05-16
14-0705	Whelan's Marina & Campground, LLC	Richmond County	2014-05-28
14-0707	Scott Stabler	James City County	2014-05-28
14-0711	William Crim	Accomack County	2014-05-28
14-0712	Captains Cove Golf and Yacht Club	Accomack County	2014-05-28
14-0713	Richard L. Day	Northumberland County	2014-05-28
14-0725	Jonathan Philip/Deborah Gordo Joint Revoc	Northampton County	2014-05-28
14-0729	Michael S. Parker	Middlesex County	2014-05-28
14-0738	Butler Properties, LLC	City of Virginia Beach	2014-05-29
14-0743	Cox Communications	York County	2014-05-29
14-0748	James Ireland	Westmoreland County	2014-05-29
14-0749	Army Corps of Engineers	multiple	2014-05-29
14-0754	Alexandria, City of	City of Alexandria	2014-05-29
14-0755	Navy, Department of	City of Virginia Beach	2014-05-29
14-0756	Tangier Oyster Company	Accomack County	2014-05-29
14-0759	Army Corps of Engineers	City of Norfolk	2014-06-04

14-0760	Virginia Electric and Power Company	City of Chesapeake	2014-06-04
14-0764	John Estevez	Northumberland County	2014-06-04
14-0766	Thomas M. Harris	Middlesex County	2014-06-04
14-0771	Max Reavis	Middlesex County	2014-06-04
14-0775	Joseph A. Forstner	Northumberland County	2014-06-04
14-0777	Joint Base Langley-Eustis	City of Hampton	2014-06-04
14-0778	Saxis, Town of	Accomack County	2014-06-04
14-0779	Patsy Hall	Gloucester County	2014-06-04
14-0788	David A. Hendrick	Northumberland County	2014-06-04
14-0791	Noel Counts	York County	2014-06-09
14-0793	Ron G. Harvey	Essex County	2014-06-09
14-0794	Harvey Morgan	Gloucester County	2014-06-09
14-0795	Accomack, County of	Accomack County	2014-06-09
14-0797	Newport News Department of Engineering	City of Newport News	2014-06-09
14-0802	Gwynn's Island Estates Property Owners A	Mathews County	2014-06-09
14-0807	Linwood E. Loving	Middlesex County	2014-06-09
14-0809	Larry M. Hogge	Mathews County	2014-06-09
14-0811	Coastal Compliance Solutions LLC	Accomack County	2014-06-09
14-0812	U.S. Geological Survey	Accomack County	2014-06-13
14-0813	Army Corps of Engineers	City of Norfolk	2014-06-13
14-0817	Virginia Institute of Marine Science	Accomack County	2014-06-13
14-0819	Sanford B. Vint	Mathews County	2014-06-13
14-0818	Presquile National Wildlife Refuge	Chesterfield County	2014-06-13
14-0649	Todd Ransone	Westmoreland County	2014-06-17
14-0673	John F. Monacell	Northumberland County	2014-07-08
14-0686	Millstone Marine Construction	City of Chesapeake	2014-06-04
14-0799	John S. Thomas, III	Westmoreland County	2014-07-08
14-0820	Ronald G. Pusey	Mathews County	2014-06-13
14-0822	Hampton Mobile Park Inc.	Mathews County	2014-06-13
14-0823	David R. Hanny, et al	King and Queen County	2014-06-13
14-0824	Nadine Pinkham	Accomack County	2014-06-13
14-0825	Betty Pruden	Middlesex County	2014-06-13
14-0826	Kellum Oyster Company, LLC	Lancaster County	2014-06-13
14-0827	Montague Island Home Owners Association	Middlesex County	2014-06-13
14-0832	Hampton Department of Public Works	City of Hampton	2014-06-13
14-0833	Barbara Mercer	City of Hampton	2014-06-13
14-0834	Dennis Koch	City of Hampton	2014-06-13
14-0835	Tacoma Hunting and Fishing Club	King William County	2014-06-13
14-0838	DCP Midstream, L.P.	City of Chesapeake	2014-06-13
14-0843	Karen L. Knaple	Accomack County	2014-06-13
14-0846	David Kreger	City of Norfolk	2014-06-17
14-0848	Jeff Rudden, et al	Northampton County	2014-06-17
14-0853	James Flynn	City of Virginia Beach	2014-06-17

14-0854	Estella Miller	City of Virginia Beach	2014-06-17
14-0855	Thomas McCormac	City of Virginia Beach	2014-06-17
14-0857	Navy, Department of	City of Virginia Beach	2014-06-17
14-0860	Bruce T. Vogt	Gloucester County	2014-06-17
14-0862	William E. Wilcox	Northumberland County	2014-06-17
14-0865	Chincoteague, Town of, Inc.	Accomack County	2014-06-17
14-0866	Kimberly J. Stevens	Northumberland County	2014-06-17
14-0868	R. Travis Whittle, III	Lancaster County	2014-06-19
14-0869	Killian F. Laschalt	Lancaster County	2014-06-19
14-0870	John Fultz	Middlesex County	2014-06-19
14-0871	Accomack, County of	Accomack County	2014-06-19
14-0881	McLean Contracting Company	City of Virginia Beach	2014-06-23
14-0883	Jeffrey McKain Living Trust	City of Virginia Beach	2014-06-23
14-0884	Hoang N. Tran	City of Chesapeake	2014-06-23
14-0889	Mildred Geisler	Lancaster County	2014-06-23
14-0890	Karl Beier	Middlesex County	2014-06-24
14-0892	Tom Kenevan	Stafford County	2014-06-24
14-0897	W. J. Brown	Lancaster County	2014-06-24
14-0902	St. Martin Properties, LLC	City of Virginia Beach	2014-06-24
14-0909	David Serway, et al	Middlesex County	2014-06-25
14-0910	Gilbert A. Nelson	Westmoreland County	2014-06-25
14-0911	Kent C. Werle	City of Portsmouth	2014-06-25
14-0914	King and Queen County	King and Queen County	2014-06-25
14-0918	Andrew P. Dwyer	Northumberland County	2014-06-30
14-0925	Leigh Hagan, et al	Northampton County	2014-06-30
14-0928	Henry Thompson	City of Virginia Beach	2014-07-02
14-0930	Northstar Marine, Inc.	Northampton County	2014-07-02
14-0933	Steven Reger	Essex County	2014-07-02
14-0934	James A. Resolute, Jr.	City of Norfolk	2014-07-02
14-0936	Dan Byrnes	City of Suffolk	2014-07-02
14-0939	Navy, Department of	City of Virginia Beach	2014-07-02
14-0940	Genrose Monola	Northumberland County	2014-07-02
14-0947	Virginia Electric and Power Company	multiple	2014-07-02
14-0949	Neilson Holdings LLC	Westmoreland County	2014-07-02
14-0950	Henrico County Department of Public Util	Henrico County	2014-07-02
14-0952	Virginia Natural Gas	City of Chesapeake	2014-07-08
14-0958	Michael Clark	York County	2014-07-08
14-0959	Joseph H. Mitchell, III	York County	2014-07-08
14-0963	Brian Ingram	Mathews County	2014-07-08
14-0967	Chesapeake Bay Bridge and Tunnel District	multiple	2014-07-08
14-0968	Dominion Virginia Power	City of Virginia Beach	2014-07-08
14-0841	Bennie J. Etheridge	Accomack County	2014-07-08
14-0979	Cedar View Beach Association	Accomack County	2014-07-10

14-0969	Ronnie Tillman	York County	2014-07-23
14-0880	Thomas H. Arnold	Gloucester County	2014-07-24
14-0966	James E. Schilthuis	Middlesex County	2014-07-24
14-0985	Jeffrey Mitchell	New Kent County	2014-07-30
14-0989	Justin S. Bell	Westmoreland County	2014-09-03
14-1000	Trust of Rebecca Holland Eggleston	Middlesex County	2014-07-10
14-1004	Charles A. McNichols	Northumberland County	2014-07-14
14-1005	Nancy W. Muldowney	Middlesex County	2014-07-14
14-1006	Kimberly Campbell	Fairfax County	2014-07-14
14-1012	David B. Hudgins, et al	Lancaster County	2014-07-16
14-1017	National Oceanic and Atmospheric Adminis	City of Virginia Beach	2014-07-16
14-1019	Virginia Electric and Power Company	City of Chesapeake	2014-07-16
14-1020	Bowlers Wharf LLC	Essex County	2014-07-16
14-1023	Virginia Electric and Power Company	City of Virginia Beach	2014-07-16
14-1026	David Dagenhart	Mathews County	2014-07-16
14-1033	A. L. Burnette	Northumberland County	2014-07-21
14-1038	R. T. Waller	Lancaster County	2014-07-21
14-1041	Brian L. Connor	Northumberland County	2014-07-21
14-1046	Harbour Pointe Homeowners Association	Northumberland County	2014-07-21
14-1048	Virginia Port Authority	City of Portsmouth	2014-07-21
14-1049	Matthew Nelson	City of Virginia Beach	2014-07-21
14-1050	Alice J. Fiveash	City of Virginia Beach	2014-07-21
14-1051	Michael Maugeri	City of Virginia Beach	2014-07-21
14-1053	Louis Snyder	City of Virginia Beach	2014-07-21
14-1036	Dominion Resources, Inc.	City of Virginia Beach	2014-07-21
14-1058	Dabney Holt	City of Virginia Beach	2014-07-23
14-1061	Ann D. Wallace	City of Hampton	2014-07-23
14-1062	Dorothy F. Wright	City of Hampton	2014-07-23
14-1063	Sandra Von Schilling	City of Hampton	2014-07-23
14-1064	Jack Lundy	City of Hampton	2014-07-23
14-1065	David Rogers	City of Hampton	2014-07-23
14-1067	John M. Ward,Jr.	Middlesex County	2014-07-23
14-1014	Roane Point L.L.C.	Mathews County	2014-07-24
14-1074	James M. Evans	Northumberland County	2014-07-24
14-1069	Diego Wolborsky, et al	City of Chesapeake	2014-07-24
14-1072	Woodshire Properties II, LLC, et al	City of Virginia Beach	2014-07-24
14-1075	Navy, Department of	City of Virginia Beach	2014-07-24
14-1077	Gregory S. Brezinski	City of Hampton	2014-07-24
14-1085	Judy R. Bartholomew	Middlesex County	2014-07-24
14-1086	William E. Robins	Middlesex County	2014-07-24
14-1093	Virginia Natural Gas	City of Hampton	2014-07-30
14-1095	Frank Nelms	Northumberland County	2014-07-30
14-1099	Tansill R. Johnson	Middlesex County	2014-07-30

14-1101	Lesley C. Hamer	Charles City County	2014-07-30
14-1102	Stephen M. Shellman	Charles City County	2014-07-30
14-1103	Lesley C. Hamer	Charles City County	2014-07-30
14-1105	Stingray Harbor LLC	Middlesex County	2014-07-30
14-1108	Collins Recap 5	City of Norfolk	2014-07-30
14-1117	Hampton, City of	City of Hampton	2014-08-01
14-1121	Camden W. Selig	City of Norfolk	2014-08-01
14-1066	James Crawford	City of Poquoson	2014-08-05
14-1126	Columbia Gulf Pipeline	City of Hopewell	2014-08-12
14-1127	Eugene Loving	City of Virginia Beach	2014-08-12
14-1128	Carolyn D. Hill, et al	James City County	2014-08-12
14-1136	Ben Sexton	Middlesex County	2014-08-12
14-1139	Wagner Holdings, LLC	Middlesex County	2014-08-12
14-1144	Dominion Terminal Associates, LLP	City of Newport News	2014-08-12
14-1145	Daniel Lytle	Northampton County	2014-08-12
14-1146	Stephen Ballard	City of Virginia Beach	2014-08-12
14-1148	Gloucester Point Holdings I, LLC, et al	Gloucester County	2014-08-12
14-1157	Chuck Dickemann	Middlesex County	2014-08-12
14-1161	Mathews Land Conservancy	Mathews County	2014-08-14
14-1169	Thomas E. Nolte	Lancaster County	2014-08-14
14-1178	Captains Cove Golf and Yacht Club	Accomack County	2014-08-12
14-1179	Chincoteague Sunsets LLC	Accomack County	2014-08-12
14-1180	Sunset Bay LLC	Accomack County	2014-08-12
14-1008	Steven Russell	King and Queen County	2014-08-22
14-1011	Mason Daniel	King and Queen County	2014-08-22
14-1175	George Zahn	Gloucester County	2014-08-22
14-1182	Walter B. Keith	Northumberland County	2014-08-12
14-1183	Philip J. Rouse, II	Northumberland County	2014-08-12
14-1185	Collins Recap III	City of Norfolk	2014-08-12
14-1189	Jon B. Hill	Northumberland County	2014-08-13
14-1192	Adam Gregory	Accomack County	2014-08-13
14-1201	James R. Gilbert	Lancaster County	2014-08-15
14-1207	Marine Hydraulics, Inc.	City of Norfolk	2014-08-20
14-1211	Raymond Pendleton	Lancaster County	2014-08-20
14-1216	Billy Pipkin	Northumberland County	2014-08-20
14-1217	Joseph Greenwell	York County	2014-08-20
14-1223	Julius Lovell, et al	City of Poquoson	2014-08-20
14-1230	Norfolk, City of	City of Norfolk	2014-08-20
14-1231	James W. Speegle	City of Hampton	2014-08-20
14-1232	Horace R. Pratt	City of Hampton	2014-08-20
14-1236	Isle of Wight County	Isle of Wight County	2014-08-20
14-1239	Robert B. Edwards	Isle of Wight County	2014-08-20
14-1233	Portsmouth, City of	City of Portsmouth	2014-08-21

14-1242	Charles Mack	Middlesex County	2014-08-21
14-1243	Fred Swearingen	Middlesex County	2014-08-21
14-1246	Andrew Cramer	City of Newport News	2014-08-21
14-1253	T. St Beane, Jr.	Northumberland County	2014-08-22
14-1255	Lisa McCartney	Accomack County	2014-08-22
14-1256	Stuart Wood	Accomack County	2014-08-22
14-1257	John Carr	Accomack County	2014-08-22
14-1258	Ronald D. Lilly	Lancaster County	2014-08-22
14-1259	Gretchen Martin	York County	2014-08-22
14-1265	Norfolk, City of	City of Norfolk	2014-08-26
14-1273	Ronald J. Smith	Isle of Wight County	2014-09-03
14-1274	Lorraine S. Fink Trust	City of Norfolk	2014-09-03
14-1277	John S. Gaske	Essex County	2014-09-03
14-1284	Dominion Virginia Power	Westmoreland County	2014-09-03
14-1289	Timothy B. Russell	Stafford County	2014-09-03
14-1291	James W. Whitten	Mathews County	2014-09-03
14-1292	James Lipscomb	Middlesex County	2014-09-03
14-1293	Rob Murianka	City of Poquoson	2014-09-03
14-1301	John Dashiell	Isle of Wight County	2014-09-03
14-1316	Richmond Dept of Planning & Development	City of Richmond	2014-09-05
14-1317	Roseroi Farm, LLC	Mathews County	2014-09-05
14-1320	Joshua Wilson	City of Virginia Beach	2014-09-09
14-1321	Adam E. Venturino, Jr.	Mathews County	2014-09-09
14-1322	Chris Bridge	Mathews County	2014-09-09
14-1323	David W. Ender	Northumberland County	2014-09-09
14-1324	Clayton Wiltshire	Gloucester County	2014-09-09
14-1325	Robert Singley	Gloucester County	2014-09-09
14-1329	Georgia H. Broyles	Essex County	2014-09-09
14-1330	Marshall S. Bray	King and Queen County	2014-09-09
14-1333	Jesse D. Powell, Jr.	Northumberland County	2014-09-09
14-1318	John Harvey	Essex County	2014-09-10
14-1319	William L. Jones	Essex County	2014-09-10
14-1346	Army Corps of Engineers	multiple	2014-09-12
14-1347	June Parker Oil Company	Essex County	2014-09-12
14-1348	Eugene M. Grant	City of Hampton	2014-09-12
14-1355	Griffin Macy	City of Virginia Beach	2014-09-12
14-1335	Roy Martin	Mathews County	2014-09-12
14-1344	Robert & Airlia Gustafson	Northampton County	2014-09-12
14-1366	Army Corps of Engineers	Isle of Wight County	2014-09-16
14-1367	Terrence Farrell	City of Poquoson	2014-09-16
14-1369	Mathews County	Mathews County	2014-09-16
14-1377	Michael S. Ives	City of Virginia Beach	2014-09-18
14-1378	Dominion Virginia Power	City of Hampton	2014-09-18

14-1386	Northpoint Properties, LLC	Westmoreland County	2014-09-18
14-1395	Tom Peterffy	Accomack County	2014-09-24
14-1397	Charles Clemons	Middlesex County	2014-09-24
14-1405	Pete Kotarides	City of Virginia Beach	2014-09-24
14-1304	Virginia Beach, City of	City of Virginia Beach	2014-09-29
14-1409	Jimmy Olson	Stafford County	2014-09-24
14-1410	Manhal Saleeby	City of Virginia Beach	2014-09-24
14-1414	Robert A. Elliott	Northumberland County	2014-09-24
14-1418	Accomack, County of	Accomack County	2014-09-24
14-1413	Vulcan Construction Materials L.P.	Caroline County	2014-09-29
14-1419	Edgar O. Hubbard,III	Northumberland County	2014-09-29
14-1421	Chris Hanna	City of Norfolk	2014-09-29
14-1423	Jay Williams	Middlesex County	2014-09-29
14-1424	Rachel D. Schrote	Westmoreland County	2014-09-29
14-1428	Heritage Cove Homeowner's Association	City of Poquoson	2014-09-29
14-1430	Robert C. Peery, Jr.	Northumberland County	2014-09-29
14-1431	Ronald L. Bevans	Northumberland County	2014-09-29
14-1438	Stingray Harbor, LLC	Middlesex County	2014-09-29